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Books.—We will forward by express, at publisher's lowest rates, any book—scientific or otherwise—to any address in the United States or Canada. We would suggest to our patrons that to avoid the risk and expense consequent on sending us the money (we do not send books C. O. D.), that orders for books be sent us through the Purchasing Department of the American Express Company.

The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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BRIEFLY TOLD.

COLONEL BENSON AND HIS MEN.—Last week we had occasion to note the [illegible] voluntary retirement from active connection with the gas industry, of Colonel Frederick S. Benson, whose resignation as Chief Engineer of the East Division of the Brooklyn Union Gas Company became effective the first instant. And this week we tersely chronicle a chapter of convincing evidence that in going out from the active ranks he takes with him the respect and friendship of the men whom he directed so well and so kindly. The evidence of their liking was shown by their assembling over 100 strong—office force, works' gangs, and service squads—early the evening of the 23d inst., in the main meter house of the Nassau station, Kent avenue and Cross street, Brooklyn, under the martialling of their Superintendent, Frederick S. Benson, Jr. The house was lined up in good order, and the Colonel having been sent for, was escorted to a seat on the raised platform of the station meter, which had been handsomely decorated and draped with the American colors. Then from out of the ranks stepped Mr. Walter Watts Tamlyn, Past Regent of De Long Council, Royal Arcanum, who, in eloquent speech, fraught with fraternity, presented, on behalf of his former subordinates, the Colonel with a massive loving cup of silver suitably inscribed. That was not all, however, for alongside the cup stood a brass easel holding a handsomely framed, beautifully engrossed set of resolutions indicative of their appreciation of his manner and method of directing them, and of their regret over his determination to relinquish the relations that had so pleasantly and successfully bound them together as master and men for many years. Naturally the recipient was affected much by this manifestation of regard, but he ultimately responded in a way that brought uncertain vision to many veterans who had served him long and faithfully. The entire proceeding was carried out in flawless way, and it really does not require noting here to close this story in the suggestion that their Chief's subsequent doings will often be matter of inquiry amongst his men.

THE MASTER'S FINDINGS SUSTAINED.—On the 20th inst., Judge Hough, of the United States District Court, rendered his opinion respecting the findings of the Master in Chancery, Mr. Masten, in respect of the New York Consolidated Gas Company's action against the authorities to have declared illegal the legislation directing that a rate in excess of 80 cents per 1,000 cubic feet might not be charged. In effect Judge Hough sustains the Master in his determinations on every main point involved. In effect Judge Hough's declarations are: That the 80-cent rate is confiscatory; that the two applying statutes taken together are unconstitutionally discriminatory; that the penalty clauses are oppressive to the point of being unconstitutional; that the legislative power in the statute creating the Commission of Gas, Water and Electricity was improperly and unlawfully delegated to that body. The case will be appealed to the United States Supreme Court, and it is understood that no dilatory tactics or any attempt at befogging the issue will be interposed by either side to delay the final adjudication.

CURRENT COMMENT.—

WE learn with much positive satisfaction that Mr. Henry A. Carpenter, for some years the head of the gas plant constructing division of the Riter-Conley Company, of Pittsburgh, Pa., has been elected

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President of the Company, vice the late Mr. Riter. The promotion is a fitting reward for a lengthy period of work well done for the Riter-Conley Company. We wish for him every possible success, and congratulate the Company on his succession to its highest directing.

MR. ROGER HIGGINS has been appointed to a responsible position in the service of the Deadwood-Lead (S. D.) Gas Company.

AFTER much dickering and cogitating the City Council of St. Thomas, Canada, has agreed to put the gas rate at $1 per 1,000 cubic feet, a concession of 15 cents per 1,000. The concession goes into effect next Wednesday.

THE sum of $1,500,000 has been raised in the city of Seoul, Korea, for the constructing and operating there of a gas works. The concern has been granted an exclusive franchise for a period of 25 years, at the end of which period the plant may be taken over by the city, in consideration of which agreement the authorities have decreed that the Company may import (duty free) all the machinery that it will need for three-fifths of the life of the franchise.

A CORRESPONDENT in Paris, Ills., writing under date of the 23d inst., says: "What do you think of this? Last week the employees of the Pana (Ills.) Gas and Electric Light Company were called out on strike by the Federation of Labor for this reason: Clarence Reed, the night engineer, was discharged for cause. He broke two rules. First, that of not blowing the warning whistle to the employees out on the line; second, for permitting visitors in the dynamo room. The men remained out 4 days; meanwhile the makeshift force managed to keep gas on the city, much to the discomfiture of the strikers. Walter Dearth, as a result of the existing conditions, has been appointed to take active charge of the works, and Mr. J. R. Green has been appointed Manager.—R. M. G."

MR. PRESTON S. MILLAR, in his capacity as Secretary of the New York Section of the Illuminating Engineering Society, informs us that the next meeting will be held in the United Engineering Societies' Building, at 8 P.M., the 9th prox. The listings call for a paper by Dr. H. H. Seabrook, on "Light and the Eye." The Society extends a general invitation to those interested in the subject to be present.

THE last meeting of the New England Section, Illuminating Engineering Society, was held according to announcement. In calling the meeting to order, President Campbell called especial attention to the fact that the next meeting would be the annual session, and expressed the hope that there would be a good attendance, as matters of importance were to be considered. The number of the evening was the paper by Prof. Puffer on "The Variables of Illuminating Engineering," and the author was rewarded by a brisk discussion, in which Professors Clifford and Puffer, Dr. Bell and Messrs. Campbell, Cod man, Curry, Hatch and Ware participated.

THE Bristol Company, of Waterbury, Conn., has been awarded a silver medal for its handsome display of recording instruments shown at the recent Jamestown exhibition. These instruments have received high awards at every exhibition in which they have been shown in the competing lists in recent years, notably those in Paris, Chicago and St. Louis.

MESSRS. NEWTON JACKSON, Wm. E. Fritz and D. R. Locher will apply to the Governor of Pennsylvania on the 13th prox. for a charter for a corporation to be known as "The Annville Gas Company," to manufacture and distribute gas to the residents of Annville, Pa., and vicinity.

A CORRESPONDENT in St. Paul, Minn., writing under date of the 23d inst., forwards the following: "Emil Ruff, Superintendent of the Rochester (Minn.) Gas Company, has left the city and is on his way to the Golden Gate. For the past 12 years Mr. Ruff has been one of Rochester's most conspicuous characters. He has been 'paragraphed' and cartooned in many papers on account of one peculiarity, that of wearing no hat in the summer time. A number of years ago his hair began to part company with his scalp, and he began to devise some means of getting it back again. The idea of going bareheaded suggested itself and he tried it. Then he found the bareheaded life to be an enjoyable one and he has kept it up. It has been 12 years since he has worn a hat in the summer time, except on special occasions. The results are evident in the fine growth of hair which he has started. It is as a pedestrian that Mr. Ruff shines. Before he came to Rochester from Duluth, he was a canoeist, and made the trip from La Crosse to Dubuque, a distance of 134 miles, in 18 hours. After he came to Rochester he took up pedestrianism."

[Continued from page 1112.]

PROCEEDINGS AMERICAN GAS INSTITUTE, SECOND ANNUAL MEETING, HELD AT THE NEW WILLARD HOTEL, WASHINGTON, D. C., OCTOBER 16, 17 AND 18, 1907.

SECOND DAY—MORNING SESSION.

REPORT OF THE COMMITTEE ON METHODS OF TAKING CANDLE POWER OF GAS.

[For the introductory sections of the Report, see *ante*, pages 1061 and 1102.]

APPENDIX D.—NOTES ON ENGLISH STANDARD CANDLES.

The use of candles has covered a period of 2,000 years. No other form of artificial light producer has so long and honorable a history. This is the result of the law of the survival of simplicity.

Candles have been made in three ways:

1. By dipping; where the wick is dipped into the melted fats, lifted and allowed to cool about the wick, then dipped again and again until the requisite diameter is obtained.

2. By moulding; which is done in a vertical position with the wick stretched centrally in the mould.

3. By rolling; in which a sheet of wax is bent around the wick and then rolled to give it firmness and a cylindrical shape. Church candles are chiefly of this sort.

We are mainly interested in the second process, or moulding, for this method was to be carried out to the production of the best and most scientifically made candles.

During all the periods from Biblical time to the 18th century, the fuel or body of the candle was chiefly composed of melted animal fats. It was crude and uneven in composition as was the wick also, and the flame smoked; but all lights were smoky and it was therefore no discredit to the candle that it, too, smoked, and science did not concern itself with the improvement of the candle.

Whatever the mode of manufacture, it seems that they were considered to give a fairly uniform light; so that when other light sources of higher intensity came into the field, it was natural to express them in terms of the ubiquitous candle.

In the 18th century the industry of whale fishing reached large proportions and sperm candles came upon the market, rivalling the wax and tallow candles. Scientists took an interest in lighting and began to study the action of the candle in producing light. They experimented in varying the size of the wick, in purifying or separating into its simpler elements the animal fats used for fuel, in the effect of varying the diameter and in methods of controlling the melting point by the admixture of ingredients.

They were sorely troubled, however, by the necessity for frequent snuffing of the wick in order to prevent a choking of the sperm flow by the falling of the wick ash with consequent smoking and guttering. Surely we shall look with added respect upon the candle, when we know that Gay-Lussac (1825) gave his attention to a cure for this trouble, recommending a flattened wick instead of a round one, in order that while burning it should curve and project the ashy tip beyond the cup. This did not wholly succeed. De Milly, in June, 1826, hit upon the scheme of washing the wick in boric acid, which at combustion produced fusion of the ash, projecting it in a bead form to the tip of the wick where total consumption took place.

In 1833, gas companies had become so act ive as to require regulating, and the "Lighting and Watching Act" was passed in Parliament. No mention was made of testing for illuminating power, however.

In 1847, another Parliamentary Act concerning the gas companies was passed, but no mention is made of a test for illuminating power.

In 1850, the Great Central Gas Act was passed by Parliament in which "Wax candles, 6 to the pound and burning 120 grains per hour," were specified for testing purposes.

It is well to state here that from 1850 dates the appearance of the paraffine candle, which, as a by-product of the petroleum industry of to-day, outnumbers all other candles.

In 1860, the Metropolitan Gas Act placed the sperm candle in the position of a standard. It, too, was specified as "6 to the pound and burning 120 grains per hour."

Clegg, in his early work on coal gas, in describing the photometric method of testing for luminosity, says: "One great difficulty attending all photometric experiments is the want of an invariable standard of comparison. Wax candles of a given size and weight were formerly used, but the wick of a wax candle requires to be snuffed and

trimmed to make it give its maximum degree of light. * * * Spermaceti candles are not liable to the same objection, and they are now generally adopted in this country as the standard. The size mostly used is a candle of 6 to the pound, burning 120 grains per hour."

He gives a foot note with the Field's address where specially prepared sperm candles for photometric experiment could be obtained.

In 1869, the paraffine candle was adopted in Germany as the Light Standard, and 2 years later, in 1871, its method of manufacture and use was minutely specified. A commissioner was named to supervise their production and to supply them of authentic value. It is well to note that but 2 years elapsed between their adoption and minute specification; whereas, with the English officials, no effort was made to better the specifications of their candles until 1893, when they were driven to it by the Gas Testing Department of the County Councils, who furnished them with standard candles well within the lax description but yet of much higher value.

Mr. H. L. Greville says in this connection (*Journal of Gas Lighting*, 6/11/'07, page 720): "Officialism represented by the County Councils (at this stage of the history) introduced a new brand of so-called standard candles which—although a legitimate standard candle—gave most disadvantageous results against the gas. * * * The candle for many years in use was the 'Miller,' and the fresh introductinn was the 'Barclay.'"

In fact, the English authorities seem to have stood still in the matter of an improved standard light from 1860 to 1893, although every report of a technical or scientific body was so condemnatory of candles as should have driven them to some action. It is interesting to parallel the efforts of the English and Germans in this matter:

The English.

Sperm candles adopted	1860
" " specified carefully	1893
Pentane air gas unit suggested	1877
" " " recommended for adoption 1881, 1888 and	1895
" 10-candle lamp adopted	1898
" " " " correction curves determined	1904

The German.

Paraffine candles adopted	1869
" " specified carefully	1871
Hefner lamp suggested	1884
" " studied, corrected and improved during several years, adopted	1893
" " correction curves determined first	1895

Complaints of irregularities in candles seem to have begun very early after their adoption, and the suggestion of Mr. Harcourt's air gas unit, in 1877, is the first tangible result of this discontent. We shall note the attitude of various committees towards the standard candle:

In August, 1881, a Committee of the Board of Trade on Photometric Standards reports favorably on Mr. Harcourt's pentane air gas unit, stating that "Compared with sperm candle, Harcourt's air gas flame is exact and trustworthy as a standard of light." (See Butterfield, 1898 ed., p. 254.)

In 1888, the Report of the Committee of the British Association, appointed for the purpose of reporting on standards of light, says: "The present standard candle is not worthy of being called a standard. Out of 118 tests on 4 standards (candles, air gas flame, 1-candle pentane lamp, amyl-acetate lamp) candles gave 87 tests differing by 1 per cent. from the day's average, 57 differed by 2 per cent. and 19 by 5 per cent. Variations of 9 and 10 per cent. occurred occasionally." The air gas unit was recommended.

In March, 1895, comes the report of the Board of Trade Committee on Photometric Standards:

"Sec. 2.—* * * We have satisfied ourselves from considerations set forth in the appendix to this report that the flame of sperm candles does not furnish a satisfactory standard, by reason of the amount of light which it affords, varying over a wide range, under conditions as to the manufacture of the candle, as to its mode of use and as to adventitious circumstances attending its use, which, as a whole, it is not possible to regulate and define.

"The substance of the appendix referred to is (Butterfield, 1898 ed., p. 252) that the melting point of the so-called sperm varies unavoidably and that the wick causes variations in the amount of light emitted. * * * The light-giving value of a candle is seriously affected by the way in which it is lighted, the length of time it has been burning, whether the cup of the candle is dry or contains melted sperm, roughness or smoothness of the wick, position of the wick toward the photometer disk and temperature of the air. * * * It is impossible to make candles which will unfailingly burn 120 grains per hour, or even within 5 per cent. of it. If even candles were made officially, with the greatest care and supervision, there would still remain variations in the amount of light given.

"For these reasons the sperm or any other candle, however manufactured, must be considered so untrustworthy that we unhesitatingly recommend its abolition as a standard of light and the introduction of some more uniform and reliable unit."

Attention is also directed to the work done by the Dutch Photometric Commission, which published its report in 1894. As an example of original, take-nothing-for-granted investigation this Commission's work is worthy of the study of every person interested in these matters.

As to candles: In order not to divide the source of light, they used 1 candle in their investigation; they determined the normal flame height to be 45 mm. and preserved as nearly that height as possible. As some light was refracted from the candle itself, as well as from the flame, they divided candles into quarters to get an average; as a candle flame is unsymmetrical, they determined the light from the broad sides and from the narrow sides of the flame and took readings for an average from the 4 positions by rotating the candle. They maintained the candle at a constant distance from the disk to insure constancy; as each quarter of the candle burns at a different rate, they determined the rate of combustion for each quarter; they obtained the candles tested from various authentic sources; they determined the average and the individual variations of candles.

After these careful examinations of candles, they say (*Progressive Age*, 10/15/'94, p. 405), of the English method of photometry then in vogue: "The principal cause of uncertainty in photometric work is the standard light employed. For example, the extreme values of an estimation by the London method may differ from one another by as much as 10 per cent., on account of variation in the actual candles employed above and below the average standard candle. The Committee has found that during 10 minutes the average light given out by a good English Parliamentary candle may exceed or fall below that of the average candle by 9 per cent. Hence, many candles ought to be employed, and this wastes much time and wearies the eye so as to make determinations unreliable; while at the same time the atmosphere in the dark room becomes vitiated and the rate of consumption of the candle varies. The observer is then tempted to meddle with the candles themselves. In Germany the flame of the candle has to be kept at a constant height and that implies meddling with the wick, while the lighting power of the candle falls in comparison with the English standard candle" (not so meddled with).

"The English use of the 2 candles cannot be recommended. * * * The average variations of the candle are 2.87 per cent. above and below; but individual variations were as much as 9.82 per cent."

The foregoing weighty opinions have been cited out of numerous less important ones, to show that a better standard was felt to be necessary, and to show how conservative the British officials were in accepting one, even when it had been strongly recommended, as in the case of the air gas flame. There seems to be no record even now that this pentane air gas was ever officially recognized in England, though it has been indirectly recognized by the acceptance of the 10-candle pentane lamp which was evaluated from the air gas flame. With the acceptance in 1897 of the 10-candle pentane lamp as the official standard in London, the sperm candle as an English standard closes its history.

Indeed, when one considers for a moment the candle specifications for 1894, it is clear that there would be extreme difficulty in making a candle of sperm, because the sperm whale is now almost unknown. So that when we import sperm candles they may be of equal average light value to the old kind, but the purity of their sperm is in question.

A strong supporter of the candle to the very end and one who said all the good that it is possible to say for the candle, was Mr. Walter Grafton, of Beckton, who, in 1898, after the adoption of the 10-candle pentane lamp, published a series of articles in the *Journal of Gas Lighting* on the subject of photometric standards. Under date of June 14, 1898, page 1377, we find his statement of how a candle should be burned and of the constancy of its light when so burned. It is almost enough to bolster up one's fading faith in the old reliable. We quote:

"Having settled upon a special make of candle to use as a standard—as the one now issued and certified by the Metropolitan Gas Referees—it is next desirable to thoroughly understand what is meant by *standard light* from such a candle,

" * * * The question may be asked (as to light value)—What is a candle?—and the writer ventures to give an answer which experimental facts furnish. It is the amount of light emitted, and maintained for at least 1 hour after maturing, from the combustion of 120 grains of sperm fed by a definite-sized wick in a quiet but pure atmosphere."

He arrives at the conclusion that no test should be accepted until the candles have been burning for at least 20 minutes. He gives five series of readings, and in each the first reading, taken too early, is high; while in all the others in the different series, amounting to 44 or more, the variation is within 1 per cent. of the normal value.

Mr. Grafton again writes in 1903, in a paper before the Institute of Gas Engineers (a report of which appears in the *Journal* of June 16, 1903, page 749) entitled "Photometry and Testing." The *Journal* says: "His paper was composed of criticism of 'weak spots remaining in the present system of testing in London,' suggestion, experiment and the result of most careful work. If there is one thing more than another about Mr. Grafton's writings, it is that they bear the stamp of the conscientious worker. After dealing with the table photometer, he admitted that the 10-candle pentane lamp is an admirable standard; but he points out certain deficiencies and loopholes for errors. He criticises the Notifications of the Gas Referees as to the method of using the lamp; and his experiments prove that variations do take place in connection with it. In order to bring the variations down to as small a compass as possible, it is necessary, he points out, among other things, that the lamp should be regulated by the outlet of the carburettor, the inlet being wide open. * * * The conclusion at which the author arrived is this: When the parts of the lamp have become thoroughly heated and the vapor regulated by the outlet tap so that the flame is 2¼ inches in length and the chimney tube set when cold to 47 mm. above the steatite burner, the standard is worthy of being called by that name and is as reliable as it is possible to get one."

The above has been quoted to show that the most ardent and most recent English advocate of the candle as a standard, has come out in an admission favoring the pentane lamp.

While in the past few years much work has been done in determining correction factors for the Hefner and the Harcourt lamps, it seems that no such scientific care has been applied for the same purpose to the candle. It is true that Frankland and Tyndall, in 1859, had tried the effect of high altitudes or of low barometric pressure upon the candle, by burning a candle on the top of Mt. Blanc. This is at an elevation which corresponds to a pressure of 16.4 inches. The candle consumed sperm at the normal rate, but the flame became as nonluminous as that of a Bunsen burner.

Methven also did some experimenting to determine the effect of aqueous vapor on the light given by the candle. He does not evolve a law or formula, but states that at certain fixed temperature he so varied his humidity as to produce a variation of 8.4 per cent. in the luminosity. The fact is, probably, that we should have waited long for correction curves for any of the flame standards had not the seasoned electric light, unaffected by atmospheric changes, come to the assistance of the photometrists.

It can be seen, however, that if a certain type of standard is tested against other standards of the same type, they will be equally affected by atmospheric changes, so that any inequalities which do appear are surely traceable to defects inherent in the standards themselves and not to extraneous causes. Such a test of candles was made by Mr. Charles O. Bond, of Philadelphia, in 1900. He selected from 30 boxes of "B.T.S." 30 single candles. These were arranged in pairs and burned in accordance with the Referee's Notification. Measurements, weighing and physical tests were also made and tabulated. It was found that the number of plaits in 4 inches of the wick varied from 33 to 37. The number of threads per strand varied from 20 to 23, the melting point varied from 111° F. to 115° F. The weight in grams varied from 36.989 to 39.663, where the standard should have been 37.8 grams. In the buoyancy test they should have sunk under an additional weight of from .13 to .26 gram; they sank under weights varying from .200 to .550 gram. The greatest importance attaches, however, to the illuminating value tests. He states: "As the lights compared are supposed to be equal, I give in the following table the average readings corrected for rate of burning, each figure given being the average of ten single readings. These figures, therefore, indicate the relative illuminating power of the pairs compared.

Column 1 shows the average of the first 10 readings. Column 2 shows the average of the second 10, conditions unchanged. Column 3 is the average of columns 1 and 2. Column 4 shows calculated readings as computed from the two preceding figures in column 3. I have purposely multiplied each result by 10 to put these results on the same scale of comparison as the pentane lamp, for ready reference."

Pairs Compared.	1.	2.	3.	4.
1 and 2.....	9.39	9.07	9.230	....
2 " 3.....	9.90	10.00	9.950	....
1 " 3.....	10.94	11.08	11.010	10.78
4 " 5.....	9.15	9.41	9.280	....
5 " 6.....	9.14	9.11	9.125	....
4 " 6.....	9.76	9.81	9.785	9.83
7 " 8.....	9.20	9.37	9.285	....
8 " 9.....	10.00	10.03	10.015	....
7 " 9.....	10.00	10.18	10.090	10.79
10 " 11.....	10.26	10.41	10.335	....
11 " 12.....	9.71	9.39	9.550	....
10 " 12.....	9.25	9.46	9.355	9.24
13 " 14.....	10.15	10.20	10.175	....
14 " 15.....	10.43	10.44	10.435	....
13 " 15.....	10.35	10.52	10.435	10.26
Average.....			9.868	

The average of column 3 will be the average relation existing among the several candles tested. Line 3, where this relation shows as 11.01, will therefore raise this average value by 11.5 per cent.; whereas, line 5, where the relation is 9.125, shows a decrease of 7.5 per cent. below the average. These are the widest individual variations.

At the time when the Referees issued their instructions for the better manufacture of candles in 1894, Dr. E. G. Love, of New York, published an article on Standard Candles on March 5, in the AMERICAN GAS LIGHT JOURNAL. He stated that it had been his custom for several years past to make a record of the physical measurements and characteristics of the different batches of candles used in the testing stations in New York. He secured samples from six different lots at the time mentioned and made a thorough tabulation of the extent to which they complied with the new Notifications. He found considerable variation in each of the following particulars:

Number of threads in a strand of wick.
Number of plaits in 4 inches of wick.
Weight of 12 inches of wick.
Weight of ash from wick.
Melting point of the spermaceti.
Weight of entire candle.
Buoyancy of individual candles.

He concludes as follows:

"The foregoing may be taken as representing the standard candles at present obtainable in this market; and it remains to be seen to what degree of perfection they may be brought under the Referee's instructions. Certainly this is a move in the right direction and undoubtedly it will result in considerable improvement, and thereby conduce to the moral rectitude of photometrists." * * * "It is rather surprising that no effort looking towards more uniformity in the manufacture of standard candles should have been made until there was a fair prospect that before long they would be replaced by some other photometrical standard."

Following Dr. Love's paper and for several years after there was a demand in this country for more uniform candles and the general impression seemed to be that the candle in use was of too high a value. The American Meter Company were large importers of candles for testing purposes, and to comply with this demand, they wrote to the English house from whom candles were obtained, voicing the demand for the standard candle made according to the Referee's Notifications. The reply stated that the English standard candle manufacturers had endeavored to live up to those requirements and had found it impracticable to do so; that the candles had not improved in uniformity in consequence of the new method, and that in short, the "By-law was a dead letter." It is well to recall the final word of the Committee on Photometric Standards at about this same date, in which this same view is borne out.

In 1898-9 the subject of municipal testing of gas in the city of Philadelphia brought forward the question of the standard candle once more and the Chief Inspector, Dr. N. Wiley Thomas, undertook to make candles meeting the exact requirements of the Referees in all particulars. He states: "While we followed minutely the requirements of the British standards and were fairly successful in the preparation of a 'practical' candle, we were unable to eliminate its

well-known variability in the every-day work of the photometer room."

W. H. GARTLEY, Chairman.
EDWARD G. COWDERY,
ALTEN S. MILLER,
WILLIAM E. MCKAY,
WALTER R. ADDICKS,
WALTER B. CLINE,
PAUL DOTY,
} Committee.

The President—We arranged yesterday to take up the report of three committees some time between 10.30 and 12 o'clock. I think we may reasonably begin taking up those committee reports, and I will call for the

REPORT OF THE COMMITTEE ON THE NEXT PLACE OF MEETING.

Mr. Irvin Butterworth—Mr. President: The report of your committee is very short. We met and decided to recommend that the Institute meet next year in Detroit, Mich.

The President—Gentlemen, you have heard the report of the Committee on Next Place of Meeting, that we meet next year in Detroit, Mich. Are there any remarks?

Mr. Pratt—I move the adoption of the report. [Seconded.]

The President—It is moved and seconded that the report of the Commitee on Next Place of Meeting be adopted. Any remarks? Those in favor please say "Aye." Contrary, "No." Carried. The Institute will meet next year in Detroit, Mich. I call for the

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Vice-President Prichard took the Chair.

Mr. J. T. Lynn read the report as follows:

Mr. President and Gentlemen: The Committee on President's Address report as follows: Favorable action has already been taken by the Institute on the changes in the Constitution recommended under the President's plan to enlarge the effective work and to extend the influence of the Institute. The prompt approval of these preliminary steps is sincere assurance that the Institute is in hearty accord with the sentiments of the address.

The reiteration of the claim for just recognition of the work performed and the progress accomplished in our industry, the refutation of false detraction, the fair statement of our duty to the people whom we serve, and the confident anticipation of appreciative co-operation of the public, command the attention and convincingly claim the indorsement of the Institute.

In this address the high plane of thought, the broad survey of our future work, the clear exposition of our present purposes, the enthusiastic devotion to professional and to civic duties, must prove a lofty inspiration to every member of the Institute, and we rejoice that the Institute begins its career by the establishment of a standard that thought may improve and experience may perfect, but time cannot impair.

J. T. LYNN,
W. E. MCKAY,
R. B. BROWN,
} Committee.

The Vice-President—You have heard the report of the Committee on President's Address. What is your pleasure?

On motion the report was adopted, and the President took the chair.

RAPORT OF NOMINATING COMMITTEE.

The President—The next business is the report of the Nominating Committee. Is the Committee ready to report?

Mr. Lathrop—Mr. President and Gentlemen: Your Nominating Committee recommend as follows:

For President—Dr. A. C. Humphreys.
For First Vice-Pres dent—Mr. Wm. H. Bradley.
For Second Vice-President—Mr. William A. Baehr.
For Members of the Board of Directors—Mr. Walton Forstall, Mr. E. G. Cowdery, Mr. K. M. Mitchell, Mr. James H. Jourdan and Mr. J. Arnold Norcross.

Pursuant to a request from the Secretary of the Board of Directors, this Committee request further time before recommending a name for the office of Secretary and Treasurer. Respectfully submitted,

A. P. LATHROP,
R. REES,
I. C. COPLEY,
R. M. SEARLE,
} Committee.

Mr. Lathrop—The other member of the Committee desires, as I understand, to present a still further report.

MINORITY REPORT.

Mr. S. J. Fowler—Mr. President: It is with sincere regret that I find myself unable to sign the majority report of the Nominating Committee; but at the beginning of its career it seems to me most important that this Institute should be started right. I cannot accede to the principle of choosing the officers of the Institute except from among those who have already done the work of its Board of Directors and have then become Vice-President. I, therefore, put in nomination

For President—Mr. C. F. Prichard.
For First Vice-President—Mr. H. L. Doherty.
For Second Vice-President—Dr. A. C. Humphreys.
For Directors—Mr. Walton Forstall, Mr. E. G. Cowdery, Mr. K. M. Mitchell, Mr. J. H. Jourdan, Mr. J. A. Norcross.

SAM'L J. FOWLER,
Minority of Nominating Committee.

Mr. Cowdery—Mr. President, I move you that the report of the majority of the Committee be accepted by this Institute as the unanimous nomination of this body.

Mr. Thompson—Second the motion.

The President—Gentlemen, you have heard the motion.

Mr. Nettleton—Mr. Chairman, I would like to make an inquiry as to what the acceptance of the report of the Nominating Committee carries with it. Will the acceptance of the report carry with it the election of the officers?

The President—I understand that the acceptance of the report will at once bring the matter before the Institute to vote upon, and as I understand a motion would probably be made to instruct the Secretary to cast the ballot of the Institute for the members named in the majority report. I assume that such would be the procedure.

Mr. Nettleton—I would like to give notice that, if it comes to that point, I wish to enter an objection. I would like to have a ballot taken for officers. Whichever way is the quickest and shortest one to reach that result I favor.

The President—the motion before the house is that the report of the majority of the Committee be accepted.

Mr. D. Mc. Donald (of Louisville)—Mr. President, I move to amend that motion. I move that we accept the minority report. [Seconded.]

The President—The motion before the house is on the amendment to Mr. Cowdery's motion, the amendment being that we accept the minority report instead of the majority report.

Mr. Egner—Mr. President, I would, under all ordinary circumstances, consider it a great privilege to nominate Dr. Humphreys for the Presidency, next to that to second such a nomination, and next thereto to vote for him; but I believe the point made by Mr. Fowler is well taken, and I certainly wish to second Mr. Fowler's report also. I believe we could not have a more representative gentleman at the head of the Institute than Dr. Humphreys, but at the same time I believe that the report made by Mr. Fowler carries much weight with it, and under the circumstances, I favor the election of Mr. Prichard, and second Mr. Fowler's report.

The President—The difference between the two reports is on the executive officers only. The Board of Directors remains the same in both cases.

Mr. Copley—I rise for information. Is there anything, in the judgment of the Chair, in the constitution or by-laws of this Institute that would prevent our taking a ballot as between the two candidates or two tickets now in the field? I would like to ask the judgment of the Chair.

The President—The Chair would rule that, in the absence of unanimous instructions to the Secretary to cast the ballot of the Institute for any person named, we must take a ballot of the enrolled members.

Mr. Copley—I hope very much that both gentlemen will withdraw their motions.

Mr. McDonald—I withdraw my motion.

A Member—I will withdraw my second.

Mr. Copley—I hope Mr. Cowdery will do the same.

Mr. Cowdery—I prefer not to withdraw it.

Mr. McDonald—I am bound to bring the matter to a vote, if I can, and if Mr. Cowdery will not withdraw his motion and let the matter come up as Mr. Copley has indicated, I will reinstate my own motion to amend by accepting the minority report. I cannot see why this convention should not be permitted to vote for all of its officers in a lump instead of voting for them by ballot as the constitution provides.

A Member—I move as a substitute that both reports be received, that the nominees in both reports be declared the nominees, and that we proceed to ballot for the officers. Let the Institute make its choice from the two lists.

Mr. Thompson—Mr. President, I rise to a point of order, and ask

that, in considering the report of the Nominating Committee, whether the Committee should not present one name for each vacancy, and that there could be no minority report from the Nominating Committee. The Constitution and By-Laws provide that any 20 members of the Institute not in accord with the recommendations of a majority of the Nominating Committee have the right to nominate whoever they like, but so far as the Nominating Committee is concerned, the report of a majority of them is the report of the Committee on Nominations, and there can be no minority report from that Committee.

Mr. A. E. Forstall—I was largely instrumental in drawing up that Constitution, and the idea in my mind was that there should be two ways of putting the question which is apparently at issue here; one, through the report of the Nominating Committee, and the other by a special nominating committee of 20 members, any 20 members who wished to put in another list. It seems to me under the Constitution that is the only way in which two tickets can be placed in the field.

The President—The Chair will rule that that interpretation of the Constitution is correct. The Nominating Committee should present a report through its Chairman, and any 20 members entitled to vote may constitute themselves a Nominating Committee and present their names, if they wish. The minority report under that ruling is not before the house.

Mr. Nettleton—In view of that ruling, Mr. President, I desire to present the report of such a Special Nominating Committee, signed by more than the requisite 20 names.

The President—Will you read the nominations, please?

Mr. Nettleton—We have copied the wording of the Constitution. In accordance with Section No. 31 of the Constitution we hereby present the following list of the active members whom we recommend as officers for the ensuing year:

For President—Mr. C. F. Prichard.
For First Vice-President—Mr. H. L. Doherty.
For Second Vice-President—Dr. A. C. Humphreys.
For Directors—Mr. Walton Forstall, Mr. E. G. Cowdery, Mr. K. M. Mitchell, Mr. J. H. Jourdan, Mr. J. A. Norcross.

C. H. Nettleton,	W. F. Norton,	F. D. Moses,
W. E. McKay,	C. A. Learned,	R. M. Kellogg,
S. J. Fowler,	W. A. Learned,	J. R. Huntting,
D. J. Collins,	A. M. Barnes,	W. A. Wood,
F. H. Sargent,	C. H. Gifford,	W. H. Frost,
J. T. Lynn,	I. A. Miller,	C. H. Nutting
J. Dell,	E. E. Witherby,	E. A. Wakeman,
J. E. Nute,	L. B. Johns,	M. R. Bump,
W. H. Gardiner,	W. H. Merritt,	F. K. Lane,
D. McDonald,	C. D. Lamson,	J. P. Kennedy,

Special Nominating Committee.

The President—Will the Secretary instruct the President whether the gentlemen whose names have just been read by Mr. Nettleton are 20 or more in number, and whether the gentlemen are members of the Institute, Possibly while the Secretary is looking that up we can proceed with the motion. The motion before the house is that we adopt the report of the majority of the Nominating Committee.

Mr. Walton Forstall—Mr. President, I move to amend that motion by instructing the Secretary to cast the ballot of the members of the Institute for the names presented by the Nominating Committee for which no other nominations have been made or presented, and which have been named on the other ticket; that is, those who have been named for Directors.

Mr. Wood—Mr. President, in regard to the nomination of Mr. Bradley, I have just been talking with him, and while he appreciates the honor which the Committee has conferred upon him by placing him in nomination, he says it would be impossible for him to accept the nomination or to serve even if he should be elected. He wished me to make that statement.

The President—I do not know what we can do now about it. I think we will have to wait for the Secretary to instruct the Chair as to whether these nominations are in regular form before we proceed to any vote on any resolution. We must be very regular about this, but I have no doubt it is all right.

The Secretary—Mr. President, I have to report that there are 30 signatures on this list, more than 20 of whom I can vouch for as being active members of the Institute entitled to vote.

The President—Gentlemen, there are now before the house two sets of nominations, those presented by the Nominating Committee, and those presented by the gentlemen whose names were read by Mr. Nettleton. They differ only in the names of the men presented for President, First Vice-President and Second Vice-President. In all other respects they are the same. Now we have before us Mr. Cowdery's motion, that the Institute adopt the report of the Nominating Committee, meaning the Nominating Committee formed by the Board of Directors, as I understand it.

Mr. Boardman—Mr. President, I would like to amend Mr. Cowdery's motion by instructing the Secretary to cast the ballot for those persons named about which there is no contest; that is, for the Board of Directors. I understand that both have submitted the same names. I think we can simplify matters in that way, and get through with the ballot much quicker, and especially when you go into the ballot, the tally will have to be taken on each name. If this resolution is passed it will eliminate just that much from the work. Therefore, for the purpose of simplifying that, and getting through with the ballot quicker, I would offer this amendment. [Seconded.]

The President—Gentlemen, it has been moved and seconded that Mr. Cowdery's motion be amended to this extent: To instruct the Secretary to cast the ballot of the Institute for the Directors who have been nominated by both sides—that is, for Walton Forstall, E. G. Cowdery, K. M. Mitchell, James H. Jourdan and J. A. Norcross—to serve as Directors during the ensuing year. That amendment has been seconded. The amendment being carried, the question will then come on Mr. Cowdery's motion that the Institute accept, or adopt the report of the Nominating Committee. Gentlement, are you ready for the question on the amendment?

Mr. Lynn—I move that the report of the minority also be accepted. There is nothing in our Constitution that says there shall not be a minority report, and as I understand parliamentary law, the minority of any committee has the right to put in a report at any time.

The President—May I suggest to Mr. Lynn that, in order to simplify the parliamentary situation, that motion be withdrawn for the present. Will you not consent to withdraw that, as I think by so doing it will greatly simplify the situation. [Motion presented by Mr. Lynn withdrawn.] The question then is on Mr. Boardman's amendment to Mr. Cowdery's motion which you have heard, gentlemen. Are there any further remarks? Those in favor will please say "Aye." Contrary minds, "No." It is unanimous. The Secretary will please cast in accordance with the instructions of the Institute the vote of the Institute for Walton Forstall, E. G. Cowdery, K. M. Mitchell, James H. Jourdan and J. A. Norcross to serve as Directors for the ensuing year. The President appointed Mr. Gardiner and another member to act as tellers to receive the vote.

The Secretary—In accordance with your instructions, Mr. President and Gentlemen of the American Gas Institute, I cast the vote of the members present for Messrs. Walton Forstall, E. G. Cowdery, K. M. Mitchell, James H. Jourdan and J. A. Norcross to serve as Directors of this Institute.

Election of Directors.

Mr. Gardiner—Mr. President, we beg to report that the Secretary has cast, as instructed by the Institute, the vote of the Institute, and thereby electing W. Forstall, E. G. Cowdery, K. M. Mitchell, James H. Jourdan and J. A. Norcross as Directors of the Institute.

The President—Gentlemen, as instructed by you, the Secretary has cast the ballot for the gentlemen named, and I, therefore, declare Walton Forstall, E. G. Cowdery, K. M. Mitchell, James H. Jourdan and J. A. Norcross elected to serve as Directors for 2 years.

Mr. Cowdery—Mr. President, I did not understand that, under the Constitution, the Secretary could cast the ballot. As it now appears otherwise I move that the report of a majority of the Committee be accepted, and that the Secretary be instructed to cast the ballot of the Association for the names mentioned, for President, First Vice-President and Second Vice President.

Mr. Donald McDonald (Louisville)—Before that motion is put, Mr. President, I want to remind all the members here that the Institute itself is much bigger and more important than any man or any set of men in it, and I do not know of any way in which a defeated candidate can get any satisfaction except by a cheerful submission to the will of the majority, whatever that may be. Where there are two candidates for the same office, somebody is bound to be defeated. Now, gentlemen, do not let us have any other kind of fight here than that which, however it may turn out, will redound to the benefit of this Institute. The members of this body in nomination on both tickets are men whom we all delight to honor, but we cannot elect them both to the same office. We cannot honor them as perhaps many of us would like to, but this fight, in view of the fact, ought to be conducted in such a spirit that whoever is defeated will feel that in the election of the others there is nothing derogatory to himself or to the best interests of the Institute. We shall have a good set of officers either way. In my opinion, the only fair way to settle the question is to take a vote, by ballot, as the Constitution provides.

Mr. Rice—Mr. President, as I understand the rules, if there is one objection to this motion which has just been made, a ballot will be in order.

The President—I so understand it. That motion cannot be put unless there is unanimous consent to the Secretary so acting. If there is one objection to this motion the matter is just where it was before. and there has been no election and will be none until you take a ballot.

Mr. Nettleton—If it is only necessary to make an objection, I object.

The President—Mr. Nettleton states that he will object to that action on Mr. Cowdery's motion. The Chair will then proceed to put the motion which is before the house. The question is on Mr. Cowdery's motion. Are there any further remarks? Those in favor please say "Aye." Contrary, "No." The motion is lost. We now have before the house two sets of nominations for President, First Vice-President and Second Vice-President.

Mr. Copley—Mr. President, I move that the Institute now proceed to determine by a written ballot its choice for President, First Vice-President and Second Vice-President. [Seconded.]

The President—It is moved and seconded that the Institute now proceed to determine, by written ballot its choice for President, First Vice-President and Second Vice-President. The Chair would suggest, if the motion is carried, that we establish the polling place outside of this room with the three tellers that the Constitution provides for, and that the voting place be open between the hours of 12 and 1:30 for the casting of the vote. That will expedite the business and give everybody an opportunity to vote as he goes out or in at any time between those hours.

Mr. Thompson—Mr. President, I offer as a suggestion that, inasmuch as the time from 12 to 1:30 is but 90 minutes, and there are 300 members here to vote, it is going to make it a very short time within which the ballot will have to be taken. After the ballot is taken, the tellers will have to count the votes, and the Institute will reassemble, I suppose, at the usual hour, 2 o'clock. Now I understand that the Secretary will have to be there with a certified list of the members for the purpose of seeing that each member who offers to vote is properly qualified to cast his ballot, and it does not seem to me, therefore, that 1½ hours constitute sufficient time for all of the members. I think it would be better if the vote were taken now.

The President—I made that suggestion simply as a suggestion. There is no motion to that effect before the house. Mr. Copley's motion is now before you, which is that the Institute now proceed by a written ballot to make its choice for President, First Vice-President and Second Vice-President. If that is carried, it means that the Institute must proceed at once to take the ballot. Are there any remarks? Those in favor of the motion will please say "Aye." Contrary minds, "No." It is carried.

Mr. Wood—Wouldn't it be well at this time to have a statement made as to just who is entitled to vote? I think there is some doubt on that point.

The Secretary—Only the active members of the Institute are entitled to vote, excepting those who are in arrears for dues for one year or more.

Mr. Lynn—Must we have a roll call?

A Member—I move that the Secretary call the roll of those who are in good standing.

The President—When the ballot is taken, no one will be allowed to vote except those who are in good standing. We have decided to vote by ballot. We shall have to follow the Constitution. The only way that the matter can be decided now is by ballot. The members will please come up in front of the tellers and the Secretary and express their preference.

Mr. Copley—Mr. President, my motion provided for a written ballot.

The President—And also the motion that we have adopted provides for a written ballot. The Secretary will call the roll, and when a member's name is called, he will come forward, make his presence known to the Secretary so that his name can be checked, and then deposit his ballot with the tellers.

A Member—Mr. President, I would suggest, as a matter of expedition in taking this ballot, that the names of the three candidates be written on one ballot, that the Secretary call the roll of the members entitled to vote, and that those candidates having the highest number of votes for each office be declared elected.

The President—The ballot will have to be counted by the tellers as the Constitution provides. Such a procedure would be unconstitutional

Mr. Searle—Mr. President, am I right in understanding that owing 1 year's dues is enough to disqualify a voter?

The President—The Secretary has made an announcement covering that point.

The Secretary—The Treasurer has a list of delinquents up to the 1st of September of this year. A few who were on that list have paid since that time. Should any voter present himself who claims to have paid since the list was made up, those cases can be adjusted as they occur.

Mr. Egner—May I suggest, Mr. President, that the names of the candidates be posted so we could see them—the names on the two opposing tickets?

The President—That has been arranged for, as I understand. They will be placed up here, at my left.

Mr. W. Forstall—It seems to me a great waste of time if we take this ballot during the time allotted for the regular business of the convention. In other words, I do not see why we could not arrange to have this ballot taken in some such way as was suggested by the President and have the business go on at the same time. The idea of voting here and taking up a lot of time of the Institute seems to me to be entirely unnecessary.

The President - In view of the action already taken we are now engaged in taking the vote, and it is too late for that. The house will proceed to ballot. The Chair appoints Mr. Waldo Learned, Mr. R. B. Brown and Mr. Donald McDonald tellers of the election. Any misspelling of a name or the omission of a title, or misstatement of a title will not necessarily invalidate a man's vote. It will be necessary to note on the ballot the name of the office for which the man is voting and the name of the man whom he desires to fill that office.

Mr. W. Forstall—Do I understand that each ballot should contain the name of just one man, or should all of the names be put upon one ballot in the way you have indicated?

The President—Each ballot should contain the names of the men whom you choose for President, for First Vice-President, and for Second Vice-President, all three names on one ticket.

Mr. Cowdery—I notice that Mr. W. H. Bradley is a candidate for Vice-President, and I understand that he would not accept if elected. Is it necessary to do anything about that.

The President—That matter is in the hands of the Nominating Committee. We have nothing from the Nominating Committee on that subject. Mr. Bradley has been nominated for First Vice-President by the Nominating Committee, and the other nomination for First Vice-President is Mr. H. L. Doherty. That is all so far as this house knows. The Chair is informed that there is some confusion among the members of the Institute as to the candidates. The candidates before the house for President are Alex. C. Humphreys and C. F. Prichard. Any man may vote for either of these but may not vote for anyone else. The candidates for First Vice-President are Mr. Bradley and Mr. Doherty. Any man may vote for either of these gentlemen, but may not vote for anyone else. The candidates for Second Vice-President are W. A. Baehr and Alex. C. Humphreys. Any man may vote for either of these men for that position and may not vote for any other man for that position.

Mr. Cowdery - It is suggested that we may both elect a President and a Vice-President at the same time in the person of Dr. Humphreys, he being a candidate for the two positions.

The President - I wish to announce that the Treasurer is in the corridor, and will receipt for dues at any time for any man who is disqualified for not paying his dues. The Chair will rule that the names of the active members entitled to vote will be called, and any man who has not voted, not here, or not hearing his named called, or who for any reason has not voted, will have the opportunity to vote from now until the time when the tellers conclude their count. The tellers will remain in this room, and they will report to the Institute at 2 o'clock. Anybody who has not voted will have the right to vote at any time from now until the tellers conclude their count. In the meantime the meeting is declared adjourned to meet at 2 o'clock.

Second Day—Afternoon Session.

The convention reassembled at 2 P.M., President Clark in the chair.

The President - The first business is to hear the report of the tellers appointed to count the ballot taken this morning.

Mr. W. A. Learned here read the

Report of the Tellers

appointed to canvas the vote for office bearers, as follows:

Gentlemen, we, the tellers appointed to receive and count your

votes for President, Vice-President and Second Vice-President, do report as follows:

First.—That we finished our count at 1:35 P.M., and, having received the ballots of all persons offering to vote, unanimously declared the polls closed at that time.

Second.—That for the office of President Dr. A. C. Humphreys received 139 votes; Mr. C. F. Prichard received 128 votes.

For the office of First Vice-President, Mr. H. L. Doherty received 149 votes; Mr. W. H. Bradley received 111 votes.

For the office of Second Vice-Preside t, Mr. W. A. Baehr received 143 votes; Dr. A. C. Humphreys received 109 votes.

Respectfully submitted, W. A. Learned, R. B. Brown, Donald McDonald, } Tellers.

Election of Officers.

The President—From the report of the Tellers, it is evident that Dr. A. C. Humphreys is elected President of the Institute for the ensuing year, that H. L. Doherty is elected First Vice-President of the Institute for the ensuing year, and that W. A. Baehr is elected Second Vice-President for the ensuing year.

Mr. Donald McDonald—Mr. President, I move that the election of all those gentlemen be made unanimous. [Seconded.]

Mr. Prichard's Speech.

Mr. Prichard—Mr. President and Gentlemen: To the philosopher there is pleasure in almost everything, so if this be defeat there are pleasures to be derived from it. That ranking first of all is the pleasure that comes to me from receiving the loyal support that I have had from those who have worked and voted for me. To those who value friends, the warm handclasp and kindly smile mean pleasure, the equal of which is to be had from no other source. Next is the pleasure that comes from any good race. There is pleasure and excitement even if you are "distanced;" there is pleasure if you are in the "also ran" class, and there certainly is pleasure in a friendly competition like this when you know you have given your opponents the run of their lives for their money. (Laughter.) There are pleasure to be had as expressed by paraphrasing the poet's line, "It is better to have run and lost than never to have run at all." There is pleasure, if one must be defeated, in being defeated by a man of Dr. Humphreys' ability; and, finally, but not by any means least of all, there is great pleasure in the privilege it earns me of moving that his election be made unanimous. [Seconded by Mr. Cowdery.]

The President—Gentlemen, it is moved and seconded that Dr. Humphreys' election to the office of President be made unanimous. Recognizing, as I do, that there is perhaps a question whether under the Constitution we can properly do that, especially if there is objection, still I believe it is the desire of the Institute that this motion be put and recorded. Therefore, if there is no objection, I will put the motion. Mr. Prichard moves, and the motion has been duly seconded, that the election of Dr. Humphreys to the office of President be made unanimous. Those in favor will please arise. You will be seated. Those opposed. I am happy to say Dr. Humphreys' election has been made unanimous.

Response of Dr. Humphreys.

Dr. A. C. Humphreys—Gentlemen of the Association: I wish to thank you sincerely for the honor which you have done me, but in accepting this office I must have regard to the responsibilities which go with it, as well as the honor. I wish to say, therefore, with that responsibility before me, and especially at this particular time, I did not seek the office. Now, however, that I have been elected to it, I shall endeavor to serve you to the best of my ability. I believe we have come upon a time when this Institute, as the representative of the gas associations and gas interests of the United States, has a very distinct and weighty responsibility laid upon it, and a large share of that responsibility must be borne by the executive. As your representatives, the Board of Directors and the officers must take up and carry that responsibility; but, primarily, the responsibility rests upon every member of the Institute, and to them the officers and directors must look for support. Before closing, let me express my very deep appreciation of the gracious way in which Mr. Prichard brought forward the motion to make my election unanimous. Mr. Prichard is a man for whom I have for many years held a very high regard, and he knows, as I know, that there has been nothing personal in this contest. I have been only too glad to say that to my friends, and that whatever the outcome was to be, it had nothing whatever to do with the friendship that existed between us. [Applause.]

President Clark's Way of Putting It.

The President—I know I express the sentiment of every member of the Institute when I say that the officers-elect have been elected in opposition to some of the very best, most able and well-intentioned men in this Institute, and they must feel that the burden is heavy upon them. When we meet a year from this time and receive the report of what the new administration has done during the coming year, the then past year, many of us will contrast it in our minds with what would have been done had their men been elected. However, we have decided—rather you have decided—to make certain men responsible for the work of the year, and you have decided that they shall be responsible as against some other men, and I cannot help but feel they have been selected to bear a very heavy responsibility. I think we all may congratulate ourselves upon the fact that they are all men of splendid ability and equal to any responsibility which may be put upon them, and that we have a fair outlook for a prosperous year. The next business is the discussion of the report submitted by Mr. Gartley and his associates.

Discussion of the Gartley Report.

Mr. A. E. Forstall—When I agreed to discuss the report of the committee I had not read it. Possibly, if I had I would not have undertaken to discuss it. Having read it, I find they have covered about everything that I intended to say when I agreed to take part in the discussion. It may be objected that the committee have given us such a counsel of perfection that it is going to be very hard to come up to it, but I think it is well to have the very best possible set before us so that we can come as near to it as we can. If there is any use taking candle power tests at all, and I think no one will deny that there is great value in them, they should be taken accurately, and the committee have shown us how to get ready to take them as accurately as possible.

Mr. Klumpp—Mr. President, I believe you have had a letter from the Illuminating Engineering Society on this topic. I think the text of the letter will be as pertinent to the subject as anything I can say. I have a copy of the letter and will read it.

Committee on Nomenclature and Standards,
Illuminating Engineering Society,
Office of the Secretary,
Washington, D. C., October 16, 1907.

Walton Clark, President, American Gas Institute—Dear Sir: About one year ago, The Illuminating Engineering Society created a committee, representing the varied interests in this country and abroad, to consider the question of establishing a suitable, and, if possible, universal nomenclature and standards for the science of illuminating engineering.

The question of a common national and international unit of candle power was taken into consideration by the American members of this International Committee, and upon motion, Dr. A. C. Humphreys, the Chairman of this Committee, appointed a sub-committe to confer with similar committees from the American Gas Institute and the American Institute of Electrical Engineers.

As a result of numerous recent investigations it has been established that the value of the candle unit defined as 1/10 of the intensity of the Harcourt 10-candle power pentane lamp is different from that obtained through the Hefner, by the use of the ratio 1 Hefner candle = 0.88 British Parliamentary candle. The amount of the difference is not definitely known, but is probably about 4 per cent., the unit obtained through the Harcourt 10-candle pentane lamp being smaller. Whether this difference is due to a change in the value of either of the two units (the candle unit in England or the Hefner unit in Germany), or whether it is due to errors in the earlier comparisons between the two units which gave the ratio 0.88 is immaterial for our present purpose. The important fact which we desire to present for your consideration is that although in the photometry of both gas and electric lamps in the United States the unit has nominally been the British Parliamentary candle, it has been obtained in different ways in the two industries.

In the photometry of gas the English example has been followed, and the candle unit in use in this country is probably not very different from that in use in England. On the other hand, the unit used in the photometry of electric lamps, following the recommendation of the American Institute of Electrical Engineers, has been obtained through the Hefner by the use of the ratio, 1 Hefner candle = 0.88 British Parliamentary candle. We are, therefore, confronted at present with the existence of two different units of candle power in

the United States, differing from each other by about 4 per cent. It is evident that such a condition is not only unfortunate but extremely disadvantageous to the better interests of either industry, and any action that would tend to bring the two units into agreement should be welcomed by all concerned, provided such action does not work hardship upon any of the interests involved.

With the establishment of State commissions for gas and electricity, which will look more and more to the Federal Bureau of Standards for standards of candle power, complications will certainly result if the unit recognized in any industry is not in agreement with that maintained at the Bnreau of Standards; and it is obviously impossible for the Federal government to maintain and legalize two different units for use in the photometry of gas and electric lamps. In a paper published by the National Bureau of Standards at Washington, attention was called to this discrepancy between the candle unit obtained through the Harcourt 10-candle power pentane lamp and that obtained from the Hefner by the use of the ratio 0.88.

In this same paper attention was also directed to the question of possible international action looking toward the establishment of a common unit of candle power for England, France and the United States. The units in use in these three countries are so nearly alike that, with the accuracy at present attainable in industrial photometry, no serious results would follow a compromise by which all three countries would agree upon a common unit of candle power. If the value of this common unit were taken as the average of the values of the units maintained at the national laboratories in the three countries, it would be very close to the mean between the two units in use in the United States in the photometry of gas and electric lamps. Therefore, a compromise in the interest of international unity would require no greater changes of unit than a compromise in the interest of national unity. Moreover, the change in unit would in no case be greater than about 2 per cent., and the effect of such a change would not be seriously felt, even in the photometry of incandescent lamps where the highest accuracy in commercial testing is attainable.

Since the German unit of candle power differs by 10 or 15 per cent. from the average value of the units in England, France and the United States, it would not seem desirable to include the German unit in taking the mean value. Either Germany could elect to adopt the international candle unit, or else the ratio of the Hefner candle to the international candle could be determined.

In consideration of the facts stated above, we, the undersigned, on behalf of the Sub-Committee of the Committee on Nomenclature and Standards of the Illuminating Engineering Society, respectfully request, therefore, that the American Gas Institute appoint a committee to confer with the sub-committee of the Illuminating Engineering Society on the question of the possible adoption of a common national and international unit of candle power.

A similar request is being made to the American Institute of Electrical Engineers, and it is hoped, through the co-operation of these two representative bodies, that some definite action will be taken.

Yours respectfully, EDW. P. HYDE,
J. B. KLUMPP.

Mr. Thompson—In connection with this letter read by Mr. Klumpp, I move that it be referred to the Technical Committee, provided for under the Constitution, for such action as they may deem proper. [Seconded.]

The President—I think it would come in much more orderly in the proceedings if these motions should be taken up at the end of the discussion. Will you not hold that motion until later?

Mr. Thompson—I will withdraw it for the present, Mr. Chairman.

The President—Mr. Waring, may we have a word from you on this subject?

Mr. Waring—Mr. President, I have nothing to say on this subject which is of any particular moment. I think Mr. Gartley has covered the ground fully. I agree with everything that he stated, and would like to emphasize the fact that candle power is not a power given by 1 candle, but the average of many. We are liable to have comparisons taken against 2 candles or more. As Mr. Gartley has very well set out in his paper, it is not the candle power of 1 candle, but the average of many.

The President—Mr. Morehead, may we hear from you?

Mr. Morehead—Mr. Chairman, a serious error liable to occur in taking the readings of a photometer to which the Committee did not refer, and one we have found in Chicago to be very real, is the error which may arise from differences between the two eyes of the man who is looking at the disk. In looking in the photometer you are looking on one side of the disk with one eye, and on the other side of the disk with the other eye. Now you balance what you see with one eye against what you see with the other without knowing whether the two eyes are the same. Anyone who wears glasses, for anything except age, knows that the formula of an oculist for the lens is never quite the same for both eyes. You take one glass and compare it with the other, and that difference is sometimes quite apparent. If you turn your glasses out and look through them from the wrong side, you will see it makes quite a difference. The old rule on sailing men-of-war was to hold on with one hand and work with the other, or "One hand for youself and one for the king." Now if we have one eye for the standard and one for the gas company, and the two eyes are not alike, I think it very well to know which way the good eye is looking. You can get a very close test on that by turning the sight-box around and putting a man over on the back side of the bar. Ordinarily a man will be looking at the standard with his left eye, but if you will simply take the sight-box and put it on the other way he will be looking at the standard with the right eye. Where there are discrepancies between the reading of two men on the same gas for a long period, you will generally find that there are differences in the eyes of one or the other of the observers. There is another point by which, it seemed to me, the Committee was putting us in somewhat of a bad light—the wholesale condemnation of the candle as a unit of light. I do not wish to be understood as being a champion of the candles. I know they are bad, and I have a great deal of trouble with them, but I question the advisability of going on record as stating that they are unreliable. Practically all of the ordinances and specifications refer to the "English standard candles burning 120 grains sperm per hour" as the standard of light. When the city inspector comes to determine the candle power he will not accept any standard except such a candle. While we know that the pentane lamp is 10-candle power, we cannot make him believe it. We can say, "There is a 10-candle power standard lamp," and he says, "Yes, I know, and there is also a screen on it by the movement of which you can make it 9 candles or 11 candles, and how am I to know that it is 10." We reply, "We have checked it with the candles and know that it is 10 candles," and he replies that "Our determination is the result of 100 tests which took 2 weeks and that he must have something to report for the next morning; that his ordinance calls for candles and he would like to compare our gas with a candle." Under the present conditions we say, "Your ordinance calls for a standard English candle burning 120 grains per hour, here is your English candle. Look at it. See the Union Jack on the box, break the seal yourself. There is the candle balance and here is the 40-grain weight. Light them up and see that they are burning at the rate of 120 grains per hour. Now make your determinations and see what you get." Under these conditions the inspector can make no complaint and he has to report whatever candle power the test shows up. If, however, he says, "Yes, the gas apparently shows what the ordinance calls for, but a committee on photometry, appointed from the most experienced and ablest members of the American Gas Institute, says that the candles which I am using as a standard are no good, and that the light is more apt to be something else than it is to be what it appears. Your own Society goes on record as backing up the committee, showing that there are 57 different varieties of objections to the candles and as many sources of error in the determinations which I have just made. For instance, the committee says that the candles will not burn 40 grains in 10 minutes, that they will not burn uniformly during the 10 minutes even when the total consumption is correct, that the candle power of the candle is affected by the vitiation of the atmosphere, by the barometric pressure, by the temperature of the photometer room, by the ventilation of that room, by any atmospheric commotion, that the light varies in intensity, that it varies in color, that it varies with the extent of the water vapor in the atmosphere and that the committee is not prepared to give any definite formula for correction for the variation for the amount of water vapor when the proportion is known." In one table the committee says that the candles of three samples varied from .930 to .899. According to some figures of the value of the standard given by the committee, an apparently 24-candle gas may be either 25.86 or it may be 21 according to the value of the standard. Further, that there is no official manufacturer of candles in the United States, that the industry is 60 years old and we have not a National standard and that there is no way of reproducing the standard. On page 95 the Committee says, "that out of 113 tests using the standard candle 80 per cent. of them were 1 per cent. off, and out of this average 5 per cent. of the candles were 19 per cent. off." It often happens that the inspector is anxious to find a low candle power and to make trouble for the gas company.

When such is the case what argument have we when the inspector proposes to correct the candle power which he found to compensate for some of the objections which the committee set forth to the standard by which he found the candle power. He can say, "It looks like a 24-candle gas, but the standard may be so much off that it is only 19 candles," and quote the action of this Association as his authority for making the reduction. The candle as a standard is bad. We admit it and regret it, but as a matter of fact being the only standard which we have we have to use it. Even if we were allowed to substitute something else we have no other standard which we could substitute, and as long as we have got to use it, and to stand behind it and to say that it is right, I question the advisability of advertising all of the objections which are set forth in the very able report of the committee.

Mr. Bond—Referring to the remarks of the last speaker, I feel I am an advocate of the pentane lamp. I think it is something better than the candles, and it seems to me that if the gas fraternity on the floor of their Institute cannot look for something better, I do not know that we can expect those who are supervising gas companies and commissions to find it for us. I think it is for us to find something better. The pentane lamp is certainly an improvement upon, and has shown a much better record than the candle as a standard. I have come into possession since I came to the meeting of a record of candle determinations kept for a series of 8 years. Fortunately, one member present has preserved his readings for this length of time, and gives in detail all the different readings. He has marked down in each case the quantity of sperm consumed in 600 seconds. That varies from 45 grains to 34 grains. Now there seemed to be neither rhyme nor reason in any method suggested by which we could explain these variations until it occurred to me that we tabulate them on the basis of the probable humidity in the air during the different seasons of the year. We immediately compiled the data for these 8 years according to the months. We know where the period of maximum and minimum humidity is in the course of the year, and by placing the data in that way we found that the average looks much better than it would in the individual cases in months where there was a small humidity. In December there was 40.05; January, 40.08; February, 40.07; March, 40.02; April, 40.35; May, 40.42. Coming to the months with a high humidity, as in July or August, the consumption drops to 38.77 and 38.62, so that this rule bears out what is shown in the report of the committee. In the report is a suggestion relative to some sort of a psychrometer to take the measurement of the humidity in the air, which I would suggest may also give a very good measure of the vitiation in a room. If this psychrometer is operated outside, and you find the difference between your wet and dry bulb, and do the same within your room, you will find the increase in the humidity. Now the increase in humidity and the increase in CO_2 run parallel. Therefore, one is just as much a measure of the vitiation as the other. This will tend to show whether the photometer room is in proper condition for taking the candle power at any time, and it makes a comparatively cheap method of determining it. It seems to me the Institute—I do not know by just what means it will be done—should take action toward the adoption of a proper burner by which the gas is to be tested, and it should have the official sanction of this body to go with the decision. If San Francisco should take its candle power from a flat flame burner, and Boston, Baltimore and New Orleans take theirs through the Argand burner, the results are not comparable by any means. I think this matter ought to be brought up.

Mr. McKay—I would like to ask a question with reference to the use of acetylene gas in this connection. I believe that pure acetylene can be used to good advantage. It is possible to store acetylene by compression so that a very small cylinder of it would serve as a standard for taking the candle power for a company probably for several years. Why isn't it a good proposition to install the acetylene burner and use it as a standard of candle power? There may be some objections to that, although I do not know what they would be. I simply ask for information.

Mr. Bond—One question, Mr. Morehead: At what distance was the man from the disk at the time that he took the observation with one eye looking at one side, and the other eye looking at the other side?

The President—Mr. McKay asked for information as to what objection there is to the use of acetylene as a standard of candle power. I would like to hear if anyone can answer that question.

Mr. Doherty—Perhaps I can give some information on that point. Several years ago I was interested in acetylene gas, at which time the variety of results secured on the photometer and otherwise rather led me to believe we wanted a more reliable standard. Acetylene came to notice at that time, but there was always some free hydrogen present, and if we do not get pure acetylene gas, and if free hydrogen is present, we are not going to have a constant quality, which would cause error in the photometrical readings. Another objection that I see to acetylene gas for photometric uses—I think it has been considered before, and believe there is some literature on the subject—was taken up seriously by a photometrical committee of one of the Associations, and acetylene was found objectionable from the fact that it was a difficult gas to burn. It was more apt to be affected by the humidity of the atmosphere than ordinary gas is, and that if you operate a burner to the best efficiency in dry air a slight change in humidity will change the efficiency of the acetylene more quickly than it will gas that does not require so much air for combustion.

Mr. Klumpp—I think the adoption of an acetylene burner as a standard would be a rather difficult problem. The combustion of acetylene requires a burner that gives a more or less intimate mixture of air, which would be difficult to control and which would greatly vary the intensity of the light given. If, for instance, an addition of oxygen is made to acetylene it will greatly increase the candles per foot, owing to an increase in the flame temperature, and produce a light too intense for direct comparison with illuminating gas. Owing to this inconvenience in regulation to burn acetylene with a constant value, I think it would be more difficult to use as a standard than illuminating gas itself.

Mr. Morris—On the subject of which Mr. Morehead has just spoken, I would like to add that, for 5 or 6 years we made a particular study of the inability of the usual assistant around a gas plant to read the bar of the photometer correctly from one side. We have found repeatedly variations running up to as high as 10 per cent. where a man was using two eyes, and the result is we have issued instructions that if a man has to use two eyes he must read from both sides of the bar. We have arranged all of our tables in that way, so that the sight box on the bar can be revolved, and have found, in looking over our records, that the variation is almost on an average of over 5 per cent. for the 6 or 7 men who are reading at that particular plant. I realized, after seating myself, that I had not completed my remarks. After we had read on both sides of the bar we came to the conclusion that the average (working 6 or 7 men so employed) was less than ½ of 1 per cent. apart.

The President—Dr. Hyde, of the National Bureau of Standards, is here. Dr. Hyde, do you care to speak on this subject?

Dr. Hyde—Mr. President and Gentlemen: I appreciate very much the courtesy extended to me to speak to you on the report of your committee on the method of taking candle power readings of gas. As the President has just explained, I am from the Bureau of Standards, or, as Commissioner MacFarland would say, from *your* Bureau of Standards. We of the Bureau are very deeply interested in all matters that pertain to standards for accurate measurements, and I want to say I am very glad indeed of an opportunity to express my appreciation of the magnificent work which your committee has done in attempting to unify methods of gas photometry. We are living in an age when systematization is of the most fundamental importance. The time is past when a manufacturer can go off into one little corner of the earth and read his candle power in any way he wants. It would be unfortunate if a man in Milwaukee and a man in Boston were talking in terms of an entirely different thing. We want system, and we want uniformity, and there is nothing that will bring them about so quickly as just such work as your committee has already done, and which I sincerely hope they will continue to do. I think it rather striking that, in the progress of the great movement towards systematization, particularly in regard to standards, photometry should be so far behind the other sciences. We have only one meter bar and only one standard kilogram. Our electrical units are very closely defined throughout the world, but in the measurement of light the condition is entirely different. There is one unit in Germany, one in England, one in France, and, unfortunately, there are at least two in the United States. It is very desirable that only one unit should be used in the photometry of gas, and it seems to me equally desirable, and almost necessary, that the unit used in the photometry of gas should be the same as that used in the photometry of electric lamps, as otherwise complications will necessarily result. The Bureau of Standards, I always like to think, should take the place of the dictionary—it records existing conditions. It should not try to inject new standards or new units any more than it is the office of the dictionary to put new words into the vocabulary; but, as you can readily see, if there is no unanimity in regard to units, it is impossi-

ble for the Bureau to have a unit which shall be in *general* agreement with the unit used throughout the country. The first step, then, consists in determining upon a common National unit of candle power. Even if we have a common National unit of candle power, however, we still have taken only a single step in the right direction; but we ought to have a common International unit. I sincerely hope the day will soon come when we will have but one unit of candle power, and if we say 10 candles or 20 candles, we will mean the same thing whether we are talking of gas or electric light, or whether we are talking in England, France or the United States. The fact of the difference between the units in use in gas and electricity, and the difficulties which have resulted, have been known for some time, but the matter has come to a head now. The Illuminating Engineering Society, which perhaps better than any other body in this country represents the various lighting interests, has taken hold of this question through its International Committee on Nomenclature and Standards, of which your honored member, the newly elected President of this Institute, is the Chairman. The action which that committee has taken in regard to this question is shown by the letter which was presented to the convention this afternoon by Mr. Klumpp. I certainly hope that you will consider very seriously the communication from the Illuminating Engineering Society. The Gas Institute is the authoritative body of this country in relation to gas matters, and if the Institute will give proper encouragement to this movement it probably will not merely be National but will become truly International in scope. The fortunate thing about our units of candle power is that, although we have an unfortunate difference, it is not very great, and could be done away with readily by compromise without any serious results to either the gas or electric industry; but as our methods of photometry are becoming more accurate every day through such action as your committee has taken in unifying and standardizing methods, and as there is just as much possibility that the units may drift apart as that they may come together, a compromise would in all probability be much more difficult of accomplishment 10 years hence than now. How the two candles in use in this country, both of which purport to be English Parliamentary candles, came to be different is a matter which time would not permit me to enter into, and into which I should hesitate to enter even though I had the time. The fact is that there are two units, and the further fact is that they are not so very different at present; about 4 per cent. or so. If the gas industry is willing to come up about 2 per cent. in its candles, and the electrical industry is willing to drop about 2 per cent., we will meet on a common ground. One other very fortunate element connected with this situation is that the intermediate value between the two units in use in this country is very close to the average value of the unit candles used in England and France. Hence, as was stated in the formal request from the Illuminating Engineering Society, any compromise in the interest of national unity would, at the same time, be a compromise in the interest of International unity, and the time probably would soon come, if the movement had the unqualified support of such bodies as this, and of the American Institute of Electrical Engineers, that we should have not only a common unit in the United States, but a common unit throughout the greater part, at least, of the civilized world. One other matter Mr. Gartley asked me to speak to you about before I close is entirely different from that on which I have just been speaking. I refer to visiting the Bureau of Standards. If there are any here who, while they are in Washington, have the opportunity, I should like them to visit the Bureau of Standards, and see the work that we are doing, and the equipment that we have. I would like to extend to you, on behalf of the Bureau, a very hearty invitation to come out. We would be very glad to have you come together at some one time, or to come separately, if that is more convenient. You will find some one there who will show you the photometric apparatus, together with any other work which you may be interested in. It will help you to see how we can help you and it will help us to learn from you how best we can help you. I hope that as many of you as possible will avail yourselves of this invitation and come out and see what we are doing.

Mr. H. L. Doherty—One point I would like to call the attention of the convention to, as it may shed more light on the value of this subject from the gas man's standpoint. I do not want to discount the advantage of knowing all about candle power and how to properly measure it, but I often think that the gas man over-estimates the importance of candle power. About two years ago, when it was proposed to fix the candle power for a certain Western city, the engineers and men interested were asked to say how much of the gas was burned in open tips. They made various guesses, then were asked to sit down and figure it out accurately. It was estimated by some that 12 per cent. of the gas was burned in open tips and others estimated it as low as 4. It was then decided to take from similar cities where different rates prevailed for fuel and light, as that would give a better indication of how much was used for illuminating, and then estimating how much of that gas was used in open tips. The determination was not far from 6 per cent. In other words, that only 6 per cent. of the gas was interested directly in candle power, and that 94 per cent. depended on the quantity of heat and flame temperature, a ratio that I know would not apply throughout cities where they have high candle powers. In a great many cities of the country where they have fuel gas development not over 6 to 10 per cent of the gas depends for its value on its candle power value.

The President—Are there any further remarks on this paper? Mr. Gartley, do you care to say anything further?

Mr. Gartley—Mr. Forstall suggested that we supplement the paper with directions for making photographic readings. In Appendix C we do give a method for standardizing and another method for taking the readings. Of course, we do not go so far as to touch upon each variety of standard, but we give an illustration of how it should be done. Mr. Morehead, who made some keen observations, referred to this as "Mr. Gartley's paper." I want to tell him, though, it is more dignified than that, for it is the report of the Committee and not my paper. Mr. Morris has also referred to the source of error that comes in through the difference in the eyes in the power of observation or definition. The Committee covered that point on page 56, in which they refer to the substitution method, and that is worthy, I think, of a little consideration: "The Committee is of the opinion that, while advocating the continued use of the bar photometer, yet every means contributing to its greater accuracy should be encouraged. To this end we recommend the 'substitution' method in testing gas. It is known that, in most cases, if two lamps, A and B, prove equal when A is at the left of the bar and B is at the right, yet they may differ slightly when B is at the left and A is at the right. This may be due to personal equation, to air drafts, unequal reflecting surfaces, or other contributing causes. If, however, A is known to have a standard value, and the desire is to rest the candle power of the gas against A's units, then substitute A in the place that will be used by the gas and evaluate B in A's terms in the position which B will continue to occupy. All that is now desired of B is that it shall continue constant, yielding always the value given it by A's units. A is then taken away, and the gas is swung into the position which A occupied. It is here subject to exactly the same environment that A had, and, through comparisons with B, obtains its candle power in terms of A. Furthermore, A, being the standard of reference, is used least and will be preserved longer." Furthermore, personally, I do not believe that there is very much difference to be found in photometrical work due to the difference of the two eyes, although I think the suggestion that Mr. Morris makes, of having a bar with a graduate on both sides and a reversible disk, is a very excellent and practical means, and more likely to be of value in proving, to my mind at least, and to the mind of a great many of the United Gas Improvement Company photometrists, that there is not very much difference to be obtained due to the difference in the power of the eyes. The sight-box should be and generally is so constructed that both eyes are used on each side of the disk. I think, however, Dr. Hyde will agree with me that this "substitution method" is a well-known scientific method of overcoming that difficulty.

Dr. Hyde—I think it is considered a better way, comparable with the other methods of taking the readings. It eliminates not only the possibility of error from difference in the eyes, but also dissymmetry in the photometer, and some difference which would come in on the two sides. We use that method entirely at the Bureau.

Mr. Gartley—Dr. Morehead objects seriously to any disparagement of the candle by this Institute. I think we have all recognized for a number of years that that is the sticking point in the subject of photometry, and yet, while the report of the Committee has or has not made an attack, so-to-speak, but has stated some of the facts regarding the candle, Mr. Morehead has not stated that anyone of those facts or statements is incorrect. He regrets that they are made. We recognize, and it is so stated in the report, that the candle does most of the work of standardizing in photometry, especially in this country. In a great many instances franchises, ordinances of councils and State laws, require that the standard candle shall be the standard by which or against which the value of the gas is judged in determining its illuminating value, and we have tried to show that the matter is not without a definite solution; that we can still get along and make progress in photometry if we will once take the stand that the candle, an individual candle, is not a reliable standard. Now the inspectors of gas from municipalities and the States may argue and say that that is what it says, and you must compare it with that, but neither the gas company nor the inspector gets the whole truth on the subject. Until very recently the matter was really in bad shape, but we now have presented to us a means of determining the unit of light, and we have a means of preserving also what is meant by 1-candle power. Admitting that 1-candle power is the average of a very large number of candles, we can determine what that unit is, we can decide on it, and we can preserve it. The electric glow lamp operated under proper conditions will run for 300 or 400 hours, I think, without change of more than $\frac{1}{4}$ of 1 per cent. It can be turned out and re-lighted, if you call that re-lighting, without any impairment, provided you do not let the voltage go above a maximum limit. Consequently, we can determine the unit and put it in the hands of the Bureau of Standards, which is a National affair and unprejudiced from one side or the other. These electric incandescent lamps having a value in terms

of the unit, can be sent out to the different laboratories of the country, they can be sent out to the gas companies wherever they have electric power and a storage battery. You can then take your standard flame lamp and compare that standard lamp against this electric lamp, this custodian of the unit, singly or in multiple under normal atmospheric conditions. If the committees of the various societies interested agree on what the unit is to be, the Bureau of Standards can always supply it, and there can be no objection on the part of any rational authority of a municipality or State to the extent that they will not use it or that they will not accept that as a standard candle power. I wanted to call attention to this table photometer.[1] It is a photometer that has been devised by the Gas Referees of London, and is used exclusively by them in their determination of the candle power of London gas. I would like to ask if any gentleman has a photometer like that in this country. [No reply.]

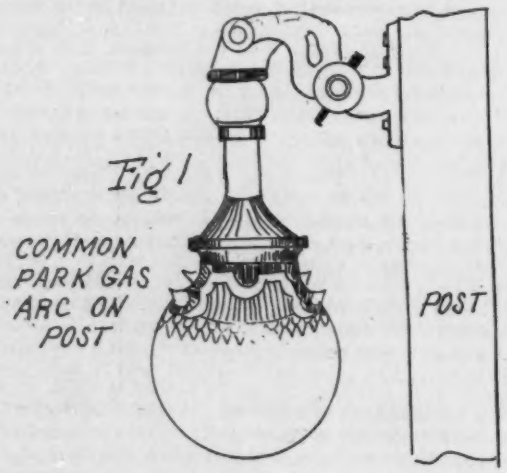
(To be Continued.)

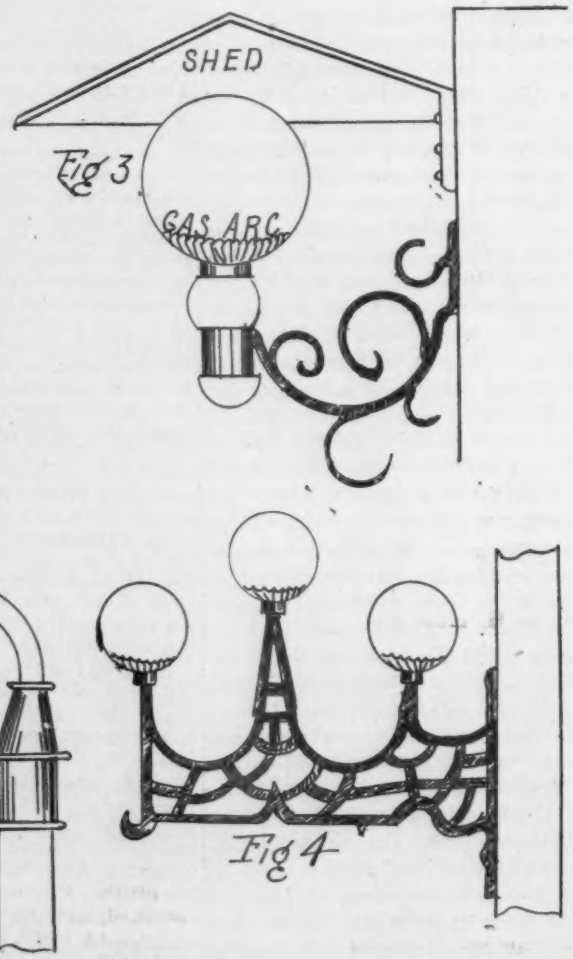
Innovation of Arc Lights in All Countries.

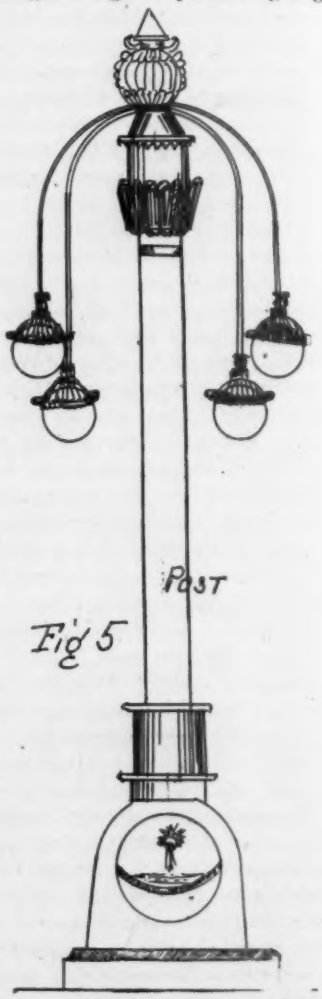
[Prepared for the JOURNAL by "R."]

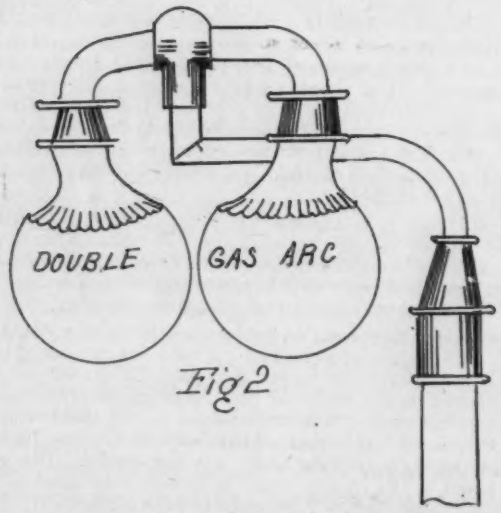
The strides which have been made in improvements in arc lights for street, hall and room lighting in the past 3 years have given the arc light a great impetus in all portions of the world. The large cities, the flourishing towns and even the hamlets have installed systems of street lighting with the modern designs of gas arcs. The parks and boulevards throughout the land are now freely lighted with gas arcs, while I notice that the motor ways, which are being planned in various parts of the country for automobiles, are going to be supplied with the reliable gas arc. There are, of course, several reasons for the universal introduction of the gas arcs. Some years ago the gas lights were not popular for exterior illumination in cases in which a broad area of light was required. Then, when the gas arcs were employed, the fixtures of the lamp posts were not just right. Various objections arose. Finally the bright, white arc lights were invented, to burn with gas, and at the same time the improved designs of ornamental street, hall and room lamps came out. With the possibility of a practical white light of exceedingly great brilliancy, at low cost, and with the possibilities of elaboration in metal and glass designs for lamps, the gas arcs jumped into favor. The result is that anyone can find numerous buildings, and thousands of miles of streets, lighted with the modern styles of gas arcs.

Some of the most notable streets of the great cities of the world are now lighted, or in process of being lighted, by gas arcs in exceedingly artistically designed lamp houses. The large cities of Europe are being liberally lighted with the interesting styles of lamps, some of which are really beautiful to look upon. Japan has introduced some very large types of ornamental glass globes on which fantastically colored serpents, dragons, etc., are painted or engraved. The Spanish delight in having brilliantly illuminated globes in their gardens and on their porches. The accompanying drawings are given to illustrate some of the interesting types of gas arc lights seen by the writer. It is quite the thing to use a very large, white, glass globe. This globe always looks well. It presents a clear, white surface on which ornamental figures may be designed. If the lamp is intended solely for interior purposes, appropriate decorations are put on for this service. If for the exterior use, some very intricate presentations are often applied, particularly in some foreign countries where the tastes of the people are appealed to. I have seen gas arc globe painters going about in Japan with samples of their work, exhibiting it to the housewife or the owner of the public retreat, with a view of securing orders.









The common park gas arcs are getting to be very popular. These lights are always illuminous to a considerable degree. In some countries regular metal posts are set up for supporting the lamps, while in others wood posts are used. Cement posts have been introduced for this work in many places.

I also saw gas arcs set up on posts made entirely from sections of the supporting pipe as illustrated in Fig. 2. The piping is not so substantial as the special post, and cannot be used in parks or along roads, or when the winds are often high, unless the pole is properly braced with extension arms. In some countries they make a cement body for supporting the single pole or pipe, casting the body about the spindle in a long, wooden flask. The project of using a pair of globes as in this cut is popular almost everywhere. The twin lamps are adjusted for gas arcs and the brilliancy of one commingles with the other, resulting in a glow which pleases. In fact, I have seen the people reading in the parks and at electrical car stations by the gas

1. A very handsome working example of the Referee's Photometer was set up in the room close to Mr. Gartley during the reading of the Committee's report and the discussion thereon.

arcs. It would seem strange that an electrical car line should put in gas arcs, but such is the case in some middle-West States.

In connection with the general advent of the gas arc for railway purposes, lighting of automobile speedways, hotels, parks and streets in general, some different forms of shelters have been introduced. Fig. 3 shows one style of securing the gas arc to the partition wall of an exterior or interior place. Perhaps the light is to illuminate the platform of a car line. In order to get protection from the rains and winds, the metallic shed is adjusted over the middle of the globe, as shown. This sheds off the rains and serves as a partial protection against wind.

Considerable grille bracket-work has been introduced to accommodate the new styles of gas arc lights. In Fig. 4 we exhibit one form of bracket. These brackets are usually cast from iron and the iron is japanned. However, for interior purposes, the brackets are frequently moulded from brass or bronze, which, of course, adds greatly to the cost of the same. There are workmen now engaged in making wrought iron lamp supporting brackets of this character. The wrought iron is able to sustain more weight and harder service than the cast, but costs more. Then there are many of these supporting brackets manufactured from the thin strip metal, about 1 inch wide, by riveting the joints. A very strong bracket results. The cast iron brackets being the cheaper, and as a rule are about as useful and strong, more of this kind are sold than any other style. I find the iron bracket on posts in parks and along the raceways. The projecting arms are designed as in Fig. 4, or to stand out in some other direction. Often there are more arms and some of them droop exceedingly for a drooping lily effect. The drooping lily effect has been applied to more lamp posts than any other style. I find it everywhere. The effect is always pleasing. We show it in the lamp post in Fig. 5. Here the post is intended for a public park. There is the conventional fountain of water. Up at the top there are the hanging arms on the ends of which the globes are affixed as shown. Sometimes there are 6 lights, sometimes 8 or 10. I have seen 12 drooping globes on a post. These posts can be made to be very ornamental. Some of the park gas arcs of this order are exceedingly pleasing to look upon. The bright, white lights shed forth the glow for a wide area.

Heretofore darkened and shadowy nooks and corners of parks, streets, porches, alcoves and kindred places are now freely lighted like day by the use of the gas arcs. One cannot avoid noticing all these improvements in the gas arc lighting line as he travels.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Dec. 10th, 1907.

Vertical Retorts.—Markets for Coal and Residuals.—Sizes of Service Pipes.—A Gas Show in the Law Court.

It can no longer be said that gas engineers have not soared beyond the hand charged horizontal retort, although it is not so very long since they were accustomed to be told that, so far as the generating vessel was concerned, they had made no advance since the days of Murdock. All sorts of shapes, sizes and angles, from perpendicular to horizontal, are now under contribution, and one wonders whether the vertical, the inclined or the horizontal will eventually occupy the foremost position as the best and most economical appliance to be used for the distinctive distillation of coal. With the vertical retort has come in a new and interesting phase of the question, which has been spoken of as the continuous method. in contradistinction to the usual practice of charging and discharging at regular periods of 4, 5 or 6 hours. In the continuous method, the period of charging is reduced to a matter of minutes. A mechanical arrangement drops in a shovelfull of coal at regular and frequent intervals, and another device removes a corresponding quantity of coke at the bottom. The term "continuous" does not necessarily imply an uninterrupted supply of coal, but rather that the evolution of gas is not interfered with. The usual method involves slacking the lid at each charge and the standing off of the retort for some minutes until the fresh charge is introduced and the lid replaced, and during that time, which under the best management cannot be less than say 2 per cent. of the total working time, the retort is doing absolutely nothing. And when a retort is charged with 2½ or 3 cwt. of cold coal, a considerable time must elapse before a proper carbonizing temperature is reached, and before that result is obtained a quantity of imperfectly carbonized matters escapes that go more towards the filling up of the tar well than lifting the holder. It is only to be expected that the continuous process should be accepted as a land of promise and that the working results should be very much better than those under the usual methods.

A process that is attracting considerable attention at the present time is that introduced by Messrs. Woodall & Duckham at Bournemouth. After careful elaboration it has also been put into operation in London at the Nine Elms station of the Gas Light and Coke Company, and at Liverpool. Some tests at Nine Elms show that 43 tons coal yielded 548,000-candle power of gas, or 12,633-cubic feet to the ton, quality 15.8 candles, gross calorific value 594 B.T.U. The coal used was taken from the store in the usual way, and had been exposed to the weather, but no correction was made for moisture. Notwithstanding the large make of gas the yield of residuals was also high, the coke averaging 14¾ cwt., tar 14 gallons, and liquor 27 gallons to the ton. It is a very unusual experience, and contrary to the general expectation, to find a 20 per cent. increased yield of gas attended by an equally large increase in the yield of tar. The analysis of the gas indicates a good quality straight coal gas, containing 35 per cent. of methane, only 7 per cent. of carbon monoxide, and 6 per cent. of nitrogen. At a recent meeting of the Manchester District Association of Gas Engineers, held at Liverpool, the visitors had an opportunity of seeing the process in operation, and of hearing Mr. Duckham deliver a brief exposition of the principles of the process, the difficulties that have been encountered and the results obtained. The system was claimed to be a realization in practice of the advantages peculiar to a continuous process, and the success was due to the continuous extraction of coke which automatically controlled the rate of carbonization, and to the fact that the retorts were heated highly especially at the upper part. And the two chief difficulties encountered were the extraction of the coke after dropping from the retorts, and the efficient heating of the settings. As the result of experience they had greatly simplified the extraction of the coke, and had got the fuel account down to 15 per cent. of the coal carbonized, with good promise of a further reduction.

Considerable attention has been directed to the vertical retort on the continent, and several installations of fairly large magnitude have been laid down. Long period charges are mostly used, and the retorts take nearly half a ton of coal at a time. No special mechanical devices are used either for drawing or charging, and the bottom is closed by a trap door and lever arrangement that allows the whole charge to fall out when desired. The analysis of the gas shows it to be very similar in composition to that above described. The proportions of methane and carbon monoxide are about the same. But the yield of gas is just under 11,000 cubic feet per ton, and the quality about 14 candle. The retorts used are barely half the length of those erected by Messrs. Woodall & Duckham, which are 25 feet long. It would appear that the best results are to be looked for in the direction of long retorts and a continuous process.

The apprehensions that were felt in the summer as to the prospects of the coal supply during the coming winter have not so far been realized, as up to the present there has been but little difficulty in securing full deliveries, and some gas undertakings have now laid in a sufficiency for Christmas and New Year requirements. No doubt some of the coal suppliers were spoiling for a boom. But the autumn has proved fairly mild, the demand in the metal trades has not been sustained, and the railway dispute has been arranged. There was considerable talk about a general strike on all the railways throughout the kingdom, as a means of forcing certain demands in the matter of pay and hours of labor. But moderate counsels have prevailed, and most of the railway men see that a strike of this nature would create so much loss and inconvenience to the public that they would have a difficulty in justifying their position. Gas suppliers are by no means the only industry dependent on the carrying power of the railways, and many of them would be able to find ways of evading such a general misfortune as a stoppage of the supply of gas. Perhaps this matter has had something to do with the demand for coke, which has been very brisk for the last year or more. There has been little opportunity of carrying any to stock during 1907, notwithstanding the increased make during the summer. Unfortunately this satisfactory position does not extend to the other products, tar and sulphate of ammonia, both of which appear to be very much weakened by overproduction. One would like to see a process for converting tar into gas. that would economize coal or petroleum, and lift half or two-thirds of the make of tar off the market. There would then be a chance of disposing of the remainder at a price somewhat in line with its intrinsic value. Attention is still being directed to the value of

tar as a dust preventer on the public road. Last summer was not remarkable for those spells of dry sunshine that accentuate the need for something to lay the dust, and consequently in many districts where the motor nuisance is not specially acute the question was shelved. But the question of applying tar, hot or cold, by the aid of machinery, is still attracting a great deal of attention, as it is found to be a means of reducing the cost of up-keep, apart from the utility as a dust preventer.

The glaring defect of gas supply as at present carried on is that there is no direct control over the size of service and internal supply pipes. The company may bring a sufficient supply up to the boundary of the premises, or up to the meter, but beyond that point the consumer can do as he likes, and is dependent upon the services of a plumber or ironmonger. Very often this important part of the work is given to the party who will undertake it at the lowest cost, and under such circumstances it is no matter of surprise if the tradesman considers his own pocket, rather than the securing of satisfactory results for the user of gas. As a result, gas managers have to bear, in addition to the consequences of their own sins, a large crop of complaint and fault finding due to causes beyond their control. It is less costly and less productive of inconvenience to abuse the gas office, than to go properly to the root of the matter and carry out an effective remedy. The gas is said to be bad or the pressure too little, when, as a matter of fact, there is no badness or littleness beyond that existing in the pipes on the consumers' premises. Every year the necessity for competent control up to the burner becomes more and more acute. The great success of the automatic meter and the cooker is known to be largely due to the fact that the whole fit-up from meter to burner is carried out by the gas company. Given a district of ordinary consumers, amongst which a slot business has gradually sprung up, it is the usual experience that the percentage of complaints of bad or insufficient supply is much less with the slots than with the ordinarys. I hope to see the example of the Perth Corporation in this matter largely followed. When applying to Parliament last year they took appropriate action with the result that the Perth Corporation Gas Order, for 1906, includes power to specify the size of house pipes either in the first instance or in case of renewal. A schedule has been drafted and public notice given that no supply of gas will be granted to any premises until all the requirements have been fulfilled to the satisfaction of the engineer. For self contained houses the requirements range from ¾-inch pipe for 2 rooms up to 1¼ inch for 16. Similar rules are laid down for tenement houses. Notice is also given that in cases of complaint an examination will be made and if it is found that the official specification is not complied with, no action or further attention to the complaint will be taken until the deficiency is remedied. It is safe to prophesy that this regulation will largely reduce the proportion of complaints and will tend to increase the demand for gas. Those who talk loudest about the rights of householders, and object to apparent interference, will be the first to acknowledge the soundness of the regulation, as soon as there is some general experience of its working.

A case of considerable interest, considering the very large number of gas stoves that are now let out on hire, came before the County Court Judge at Salford, a few days since. The Corporation of Salford, as owners of the gas works, sued a gas consumer to recover the value of a cooker ruined by an explosion of gas, presumably caused by inadvertently leaving the tap for the oven supply turned on, filling the oven with gas, and when a light was applied to one of the top burners, the explosion was the result. The facts were not disputed, and the receipt of a card of instructions with the stove was admitted. Evidence was given to the effect that accidents with gas cookers were of rare occurrence, and would not take place if the taps were properly controlled. The judge said that if the printed instructions were followed, disasters would not occur, and awarded the Corporation the amount claimed. Most gas managers have had experience of similar accidents, due to the oven tap being tampered with by a child, or accidentally touched by the dress of the cook, but they have been greatly reduced by the special precautions adopted by the leading makers. In the earlier designs the taps were all in one row and of similar make, so that it was quite easy for the oven tap to be turned in mistake for a top burner tap. But for some years the usual plan is to make the oven tap a different size to the others, to make the crutch oval instead of square, without corners for anything to catch on, and to place it on the oven supply pipe some distance away from the bar supplying the boiling burners. With these precautions accidents are very few and far between and the gas cooker is safer than an open fire or stove.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

"Subscriber," writing from Brockport, N. Y., forwards the following under date of the 19th inst.: "The Brockport Gas Light Company is about to rebuild its works aad has awarded for that furtherance the following contracts: Condensing, scrubbing and tar extracting apparatus, and a set of 4 purifiers and a new station meter to the Kerr Murray Manufacturing Company, and the refitting of a bench of 6's to the James Gardner, Jr., Company; the Company having been granted a franchise for the right to distribute gas in the village of Holley, and a similar right for the village of Clarkson. This will involve the placing of 6 miles of pipe, and that work, together with the plant betterment, will surely keep Superintendent Trout out of the paths of idleness—even if he ever did travel that way."

Mr. J. E. D'Alemberte, Manager of the Gulf Coast Gas Company, of Biloxi, Miss., informs us that the Company intends putting in a new water gas set, purifying boxes, and compression storage tanks; having found the pressure of new business so great. This would look rather speedy traveling, for the Gulf folks only started in business in August, 1906.

Mr. E. J. Babcock, Dean of the State University and School of Mines, of North Dakota, informs us that an experimental and testing department has been established by the State in connection with the School of Mines, for the purpose of testing in a practical way the various mineral resources of the State, such results to be published in bulletins printed regularly. Dean Babcock is now ready to take up an extended investigation of the coals of North Dakota with reference to their possible utility for gas producing, and he proposes to install one or more small working gas plants which will be modified to meet the requirements for the coal. The mining students will also be given instruction in methods of gas making in connection with such a plant.

The vote taken in Great Falls, Mont., last Monday, on the proposition to grant a franchise for the construction and operation of a gas plant in that city, greatly favored the scheme. The main one in interest seems to be Charles U. Gordon.

"R.," writing from Peoria, Ills., under date of the 24th inst., says: "We note your reference respecting the formation of a bowling team by the Milwaukee Gas Company. We think we have a pretty good one here in the team of the Peoria Gas and Electric Light Company. At any rate we are ready for proposals."

The project to put in a modern gas plant in Yankton, S. D., is seemingly at the doing point.

The Directors of the Hartford City (Conn.) Gas Light Company are discussing the advisability of putting in and operating on own account an electric lighting plant. No doubt the pros and cons in this respect have been closely studied; and they would well need be.

At the annual meeting of the North Attleboro (Mass.) Gas Light Company the officers chosen were: Directors, Ira Barrows, E. A. Codding, Joseph G. Barden, Woodbury Melcher, Ira Richards and H. F. Barrows; President, H. F. Barrows; Treasurer, E. E. King. The latter succeeds Mr. C. H. Randall, who has well and worthily filled the position for many years. More's the pity, his resignation was prompted solely by ill health.

His host of friends will be pleased to know that J. K. Callahan, since his retirement from the service of the Wilkes-Barre (Pa.) Gas and Electric Company, has made an important business deal whereunder he secures complete control of the well established business known as the Vosburgh Carriage Manufacturing Company. The best of good luck to him.

The proprietors of the Leominster (Mass.) Gas and Electric Light Company are arranging to extend the Company's main system to the outlying district of Lunenberg.

Mr. Edwin M. Walker, of Columbus, Miss., has been appointed General Manager of the Muscatine, Ia., Citizens Railway and Light Company, and Mr. A. L. Gillett, of the St. Paul (Minn.) Gas and Electric Company, has been appointed its Superintendent.

A CORRESPONDENT in Milford, Mass., writing under date of the 22d inst., incloses the following: "There is not a word of truth in the rumor,', said B. E. Harris, one of the largest and most influential stockholders in the Milford Gas Light Company, when interviewed at his home to-night. Mr. Harris made the statement in answer to the report circulated in Milford this afternoon, that a plan was on to consolidate the Milford Gas Light Company with the concerns supplying the towns of South Framingham, Natick and Wellesley with gas. Rumor had it that the reason for the reported consolidation is that the Milford officials of the Gas Light Company were convinced that the method of making gas in Milford is expensive, and that in a short time many of its mains will have to be replaced, if the present system of supplying gas is continued. The report had it that the Milford officials had already been in secret conference with the officials of the South Framingham Gas Company and Boston gas magnates, regarding the proposed consolidation. Frank J. Dutcher, Hopedale, one of the Directors of the Milford Gas Light Company, said such a report was new to him, and he did not believe there was any foundation for it."

"F. M. S.," writing from Denver, Col., under date of the 21st inst., forwards the following: "Royal gentleman that he is, I'm sorry to have to inform you that the residence of Mr. Philip Cross, Manager of the new business division of the Denver Gas and Electric Company, was visited by burglars this week, who ransacked the dining room quite completely, making away with silverware the value of which was not far from $1,000. Mr. Cross' overcoat was also included in the loot, and some other articles of value went with the silver and the coat. The silver taken numbered several pieces especially prized as wedding gifts."

Mr. B. F. BULLOCK, Superintendent of the Fredericksburg (Va.) City Gas Works, writing under date of the 21st inst., says:

To the Editors AMERICAN GAS LIGHT JOURNAL: Acting upon an invitation of Mr. Milan R. Bump, Editor of the Wrinkle Department of the American Gas Institute, I sent in a Wrinkle to the last budget, explanatory of our method of charging inclined retorts. This appeared in the book containing the papers to be read at the Washington meeting of the Institute, and subsequently in a recent issue of the JOURNAL, and as one of the statements made is misleading, I would ask you for space in which to correct the same. The Wrinkle is not as I wrote, but rather as Mr. Bump thought it should have been written. Quoting from a copy of 'Papers to be Read' it is said on page 104: 'One man can perform the whole discharging and charging work in less than 4 minutes.' As I have seen three men draw and charge six retorts in 5 minutes, using 250 pounds of coal per retort, the above statement would seem to be remarkable for the very long time it took to complete the operation. As we employ one man, per shift, necessarily he must do all of the work, and as our charges are governed entirely by the quantity of gas required, they range from 400 pounds to sometimes over 600 pounds per charge. The labor required to make a charge is as follows: Light off the lower lid and open it, auger the standpipe, take out the stopper, and remove the coke—this must be quenched so that the coal stopper can be replaced—then close the lid, ascend the stairs and open the top lid, wheel the charge in place and dump it, then close the lid again. The actual time of making the charge is about 10 seconds, the time of removing is about 30 seconds; the rest of the time is taken up handling the stopper, quenching the coke, going up stairs, opening and closing the lids and wheeling the wagon."

THE gas, electric light and steam heat plants of Clinton, Ills., formerly operated by the Clinton Gas Company, have been sold, through the Gas and Electric Development Company, of Philadelphia, to a newly organized concern known as the Clinton Gas and Electric Company. The latter assumed charge the 1st inst., and many improvements and extensions have been planned. The Gas and Electric Development Company, now operating plants in New York State and Missouri, will have charge of the future operations of the Clinton properties.

MISS KATHERINE KRAMER, for quite a while on the office staff of the Elgin (Ills.) Gas and Electric Company, will retire therefrom the 1st prox.

SOME evenings ago a very complete lecture on the "Manufacture of Illuminating Gas" was given in the Loyola College Hall, Baltimore, by Mr. McDowell, under the auspices of the Loyola Scientific Society. The lecture, which was illustrated by the lantern slide method, was attended by the College Faculty as well as the students.

THE annual report of the Worcester (Mass.) Gas Light Company shows clearly what a prosperous year was the Company's. Despite the reduction in selling rates the Company's income showed a gain of $36,511.10. In the receipts residuals figure at the good, round sum of $34,154.

THE Fall River (Mass.) Gas Works Company has purchased a plot of land on Birch street, between Bay street and the railroad tracks, consisting of 2½ acres. It looks that the Company is getting ready for a new plant, between the present and 1910.

THIS, in addition to prior mention of the subject, is from the Hartford (Conn.) *Times*, and is official: "At the annual meeting of the Electric Gas Company, of America, held at the appointed time in this city, General John P. Harbison retired from the Presidency of the Company and also from the Board of Directors. The General said he retired on account of the state of his health. By the direction of his physician he is compelled to relinquish business cares. The other Directors accepted the General's resignation with regret. Immediately on the acceptance of his resignation, General Harbison withdrew from the meeting. Attorney Joseph Tuttle, the Secretary, was appointed temporary President of the Company. The resignation of General Harbison was a complete surprise to his colleagues on the Board of Directors. The other Directors present were Joseph P. Tuttle, A. C. Bill of this city; Burhans Van Steenbergh, of New York, and Daniel N. Morgan, of Bridgeport. General Harbison stated positively that his resignation was due entirely to the state of his health and to the necessity of giving up business responsibilities. He said he has as much faith in the invention and system of electric gas as he ever had. His interest in the State Fair movement will give him all the additional business activity which he cares to engage in."

SOME days ago the plant of the Kokomo (Ind.) Gas Company was damaged by explosion and fire, which resulted in a loss well under $600. The local papers next day gave such glowing accounts of the blaze that one could be well excused for believing that the whole structure was down and out. The supply of gas was not even interrupted.

THE Freehold (N. J.) Gas Company is again showing signs of life, in the shape of some more patchwork plant betterments.

THE contract for the new buildings of the Beaumont (Tex.) Gas Company has been awarded to Mr. J. C. Herrenkind. They are to be of concrete blocks.

"L. G. S.," forwards the following, from Chicago, under recent date: "The Peoples Gas Light and Coke Company can now go ahead with the construction of its big holding tanks in the Englewood district, work on which has been suspended for some time by reason of an injunction issued by Judge Tuthill in behalf of property owners in that immediate vicinity. Judge Tuthill dissolved the injunction following the filing for record of 12 deeds running to the Company which give the latter a majority frontage in Grove avenue, between 64th and 65th streets, and on the two latter streets, in the block east of Grove avenue. Ten of the deeds were for an aggregate consideration of $33,530 and two were for nominal considerations. The acquirement of this property was made necessary to prevent the injunction being made permanent and entailing a large loss on the Company. The proposed plant is expected to cost around $500,000. Trouble began when the city at the request of property owners took steps to cancel the permit previously issued to the Company for the construction of the plant. The Company retaliated by asking Judge Honoré to enjoin the city from doing this while the property owners asked that the Company be enjoined from prosecuting its work on the ground that it was a nuisance and conflicted with the charter provisions regarding frontage. The Company contended that a majority frontage on 64th street was sufficient. Judge Honoré upheld the contentions of the Company, whereupon the property owners withdrew their suit and began proceedings before Judge Tuthill, asking for an injunction. A temporary injunction was granted, the judge holding that a majority frontage on other streets named was also necessary. Then the Company secured the necessary frontage."

THE AMERICAN GAS LIGHT JOURNAL

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, DECEMBER 30, 1907.

The Market for Gas Securities.

The cause for the rise in Consolidated gas was explained less than half hour after we went to press last Friday. The United States Circuit Court, through Judge Hough, had affirmed the findings of Master Masten in the contention over the illegality of the 80-cent rate. Another cause for strength since then is the action of the State judiciary in virtually affirming the Company's right to the contract price of 1900 for gas supplied on public lighting account. Millions are involved in this, but it is bearing legal interest. Consolidated opened this morning at 94½ to 95. It will speedily go very much higher.

Brooklyn Union is somewhat stronger. Massachusetts Gas Companies feels the impulse of better times, as is also the case respecting Peoples, of Chicago. The bond market is decidedly better. Bay State gas is in a decidedly recrudescent state.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

DECEMBER 30.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	94⅛	95
Central Union Gas Co.—				
1st 5's, due 1972, J. & J	3,000,000	1,000	92	97
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual	2,500,000	100	—	170
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	80	85
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	90	98
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Standard	5,000,000	100	70	100
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	88	94
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	92
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	½	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	5,250,000	1,000	63	66
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,600,000	1,000	104	105¾
Cincinnati Gas and Electric Co.	29,500,000	100	92½	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	87	88
Preferred	3,026,500	100	107½	108
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	90
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Detroit City Gas Co.	6,000,000	50	—	50
" Prior Lien 5's	4,618,000	1,000	—	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Capids Gas Lt. Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	100	105
" Bonds, 5's	10,500,000	—	101	102½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,500,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	250,000	1,000	97	100
Kansas Cits Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	97	97¼
Preferred	2,500,000	100	92¾	93
Bonds	10,000,000	1,000	104	104½
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	106¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	27,000,000	100	47	47¼
Preferred	25,000,000	100	76	76½
Montreal, Canda	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	86	88
Bonds, 6's	6,000,000	—	132	134
New Haven	2,000,000	25	200	—
Peoples G. Lt. & Coke Co., Chicago	25,000,000	100	78	78½
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Elec. Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco, Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	92	—
St. Paul Gas Light Co.	1,500,000	100	45	47
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General Mortgage, 5's	2,415,000	1,000	96¾	—
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	102	—
Washington, D. C.	2,600,000	20	345	355
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Western, Milwaukee	4,000,000	—	—	—
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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, PA., Dec. 11, 1907.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Jan. 15th, 1908, to stockholders of record at the close of business, Dec. 31, 1907. Checks will be mailed.

1697-5 LEWIS LILLIE, Treasurer.

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WANTED,

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By one who has had wide practical experience and has met with success in above capacity. Can furnish excellent references. Address, "J. O.,"
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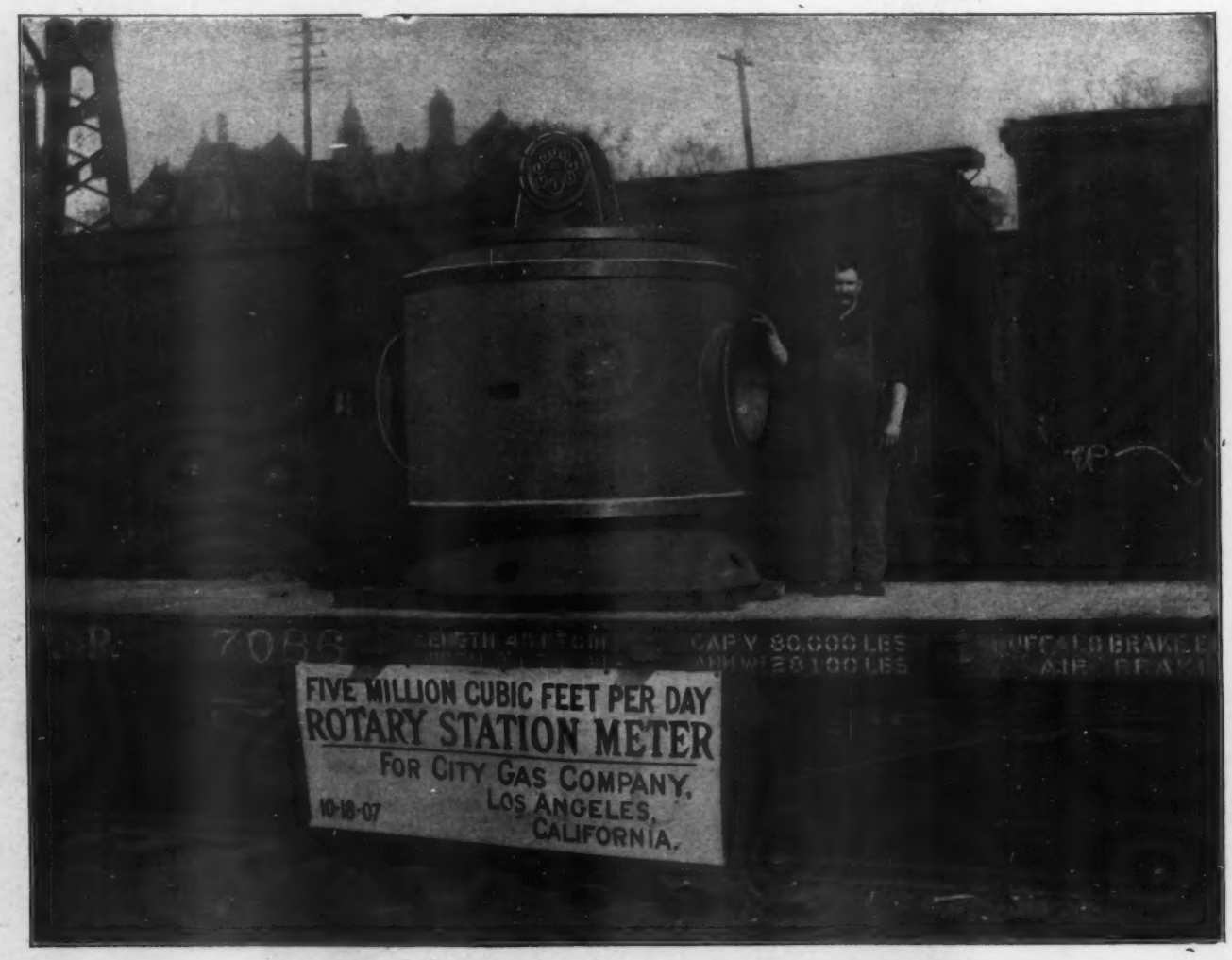

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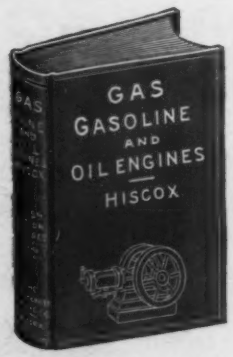

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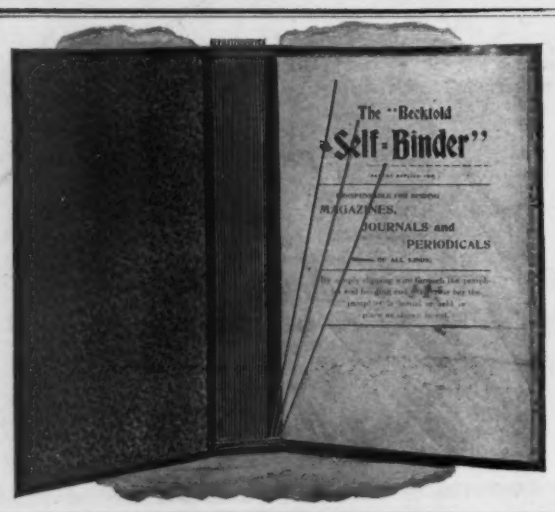

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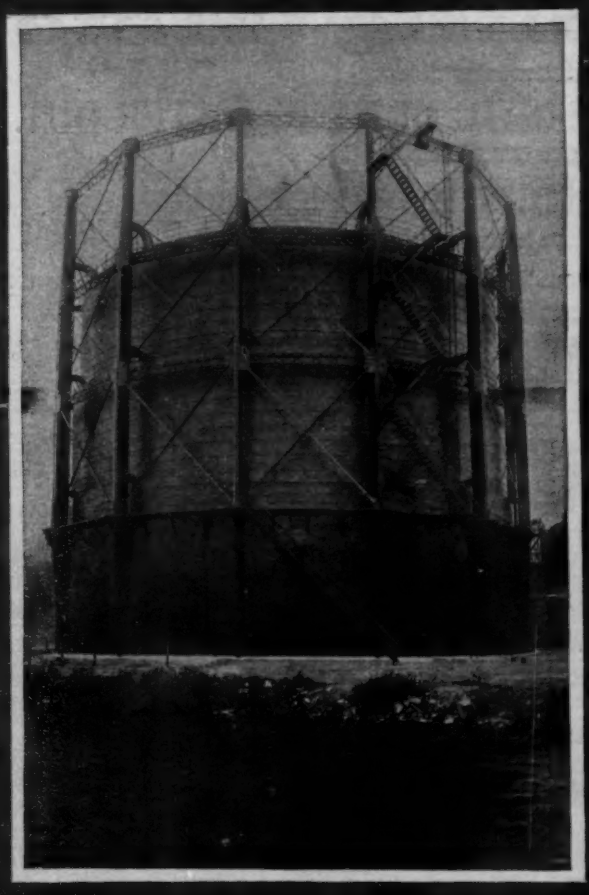

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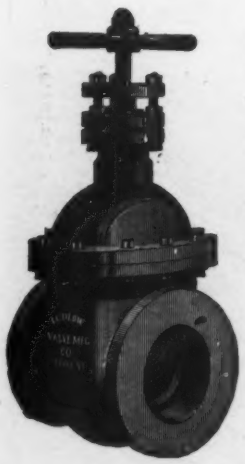

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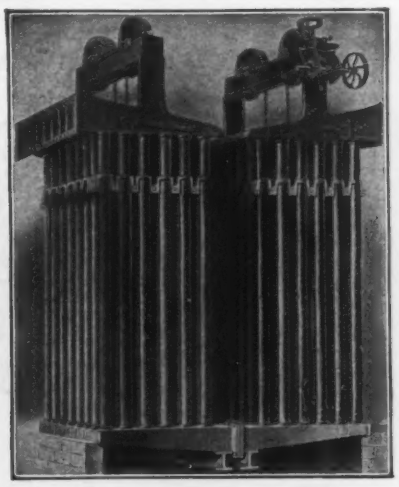

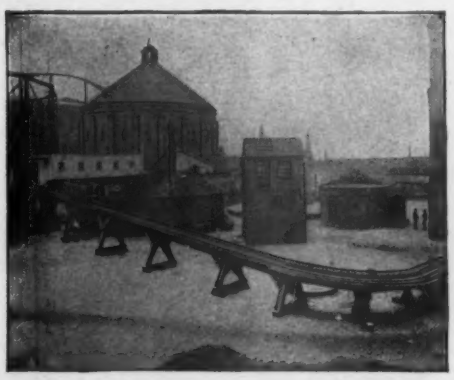

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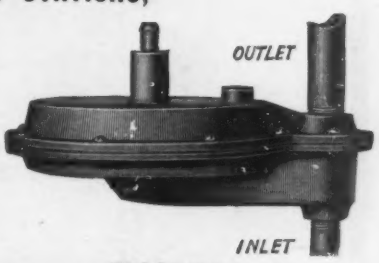

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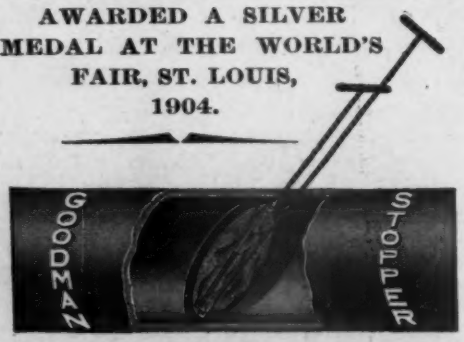

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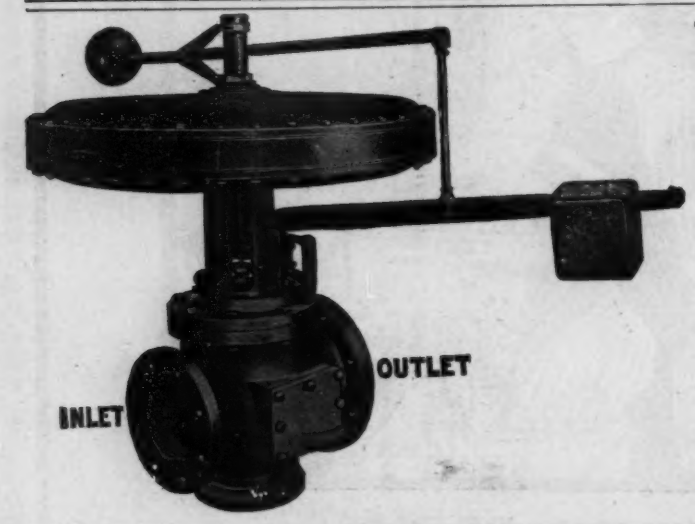

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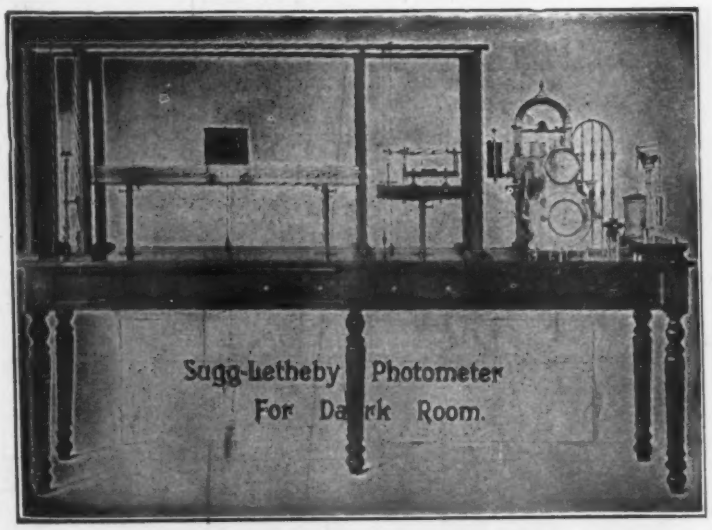
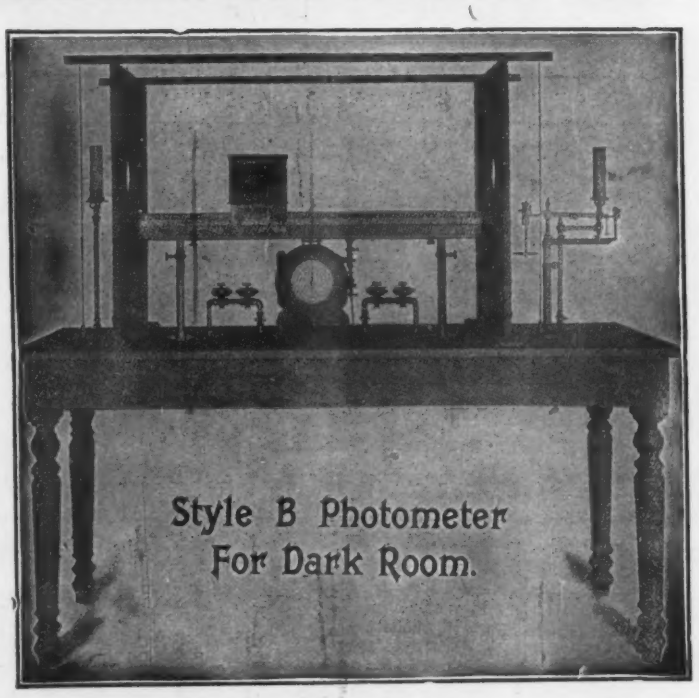
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Wed.	1	5.10 PM	6.20 AM
Thu.	2	5.10	6.20
Fri	3	5.10 NM	6.20
Sat.	4	5.10	6.20
Sun.	5	5.20	6.20
Mon.	6	5.20	6.20
Tue.	7	5.20	6.20
Wed.	8	9.40	6.20
Thu.	9	10 50	6.20
Fri.	10	11.50 FQ	6.20
Sat.	11	12.50 AM	6.20
Sun.	12	2.00	6.20
Mon.	13	3.00	6.20
Tue.	14	3.50	6.20
Wed.	15	4.50	6.20
Thu.	16	5.40	6.20
Fri.	17	No L.	No L.
Sat.	18	No L FM	No L.
Sun.	19	No L.	No L.
Mon.	20	5.30 PM	8.00 PM
Tue.	21	5.30	9.00
Wed.	22	5.30	10.00
Thu.	23	5.30	11.00
Fri.	24	5.30	12.00
Sat.	25	5 30	1.00 AM
Sun.	26	5.40 LQ	2.10
Mon.	27	5.40	3.20
Tue.	28	5.40	4 20
Wed.	29	5.40	6.10
Thu.	30	5.40	6.10
Fri.	31	5.40	6.10

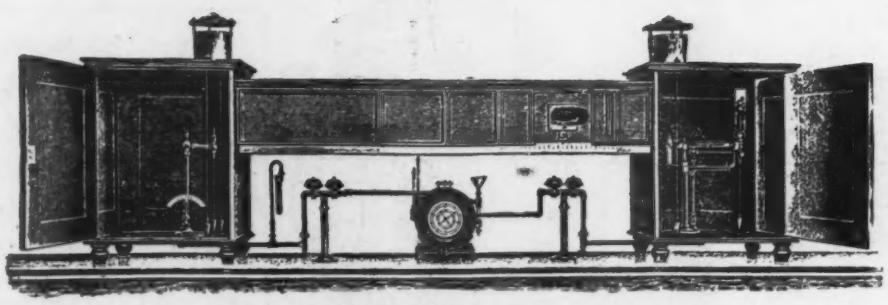
TOTAL HOURS DURING 1908.

By Table No. 1.

	Hrs.Min.
January	228.30
February	187.30
March	192.00
April	160.10
May	155.10
June	138.00
July	155.50
August	173.40
September	185.20
October	214.00
November	218.10
December	226.40
Total, yr.	2235.00







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

JANUARY, 1908.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Complete Lighting in One Hour (From Time Given) P. M.	Complete Extinguishing in 50 Minutes (From Time Given) A.M.
Wed.	1	4.12	6.27
Thu.	2	4.12	6.27
Fri.	3	4.12	6.27
Sat.	4	4 12	6.27
Sun.	5	4 12	6.27
Mon.	6	4.12	6.27
Tue.	7	4.12	6.27
Wed.	8	4.22	6.22
Thu.	9	4.22	6.22
Fri.	10	4 22	6.22
Sat.	11	4.22	6.22
Sun.	12	4.22	6.22
Mon.	13	4 22	6.22
Tue.	14	4 22	6.22
Wed.	15	4 32	6.17
Thu.	16	4 32	6.17
Fri.	17	4.32	6.17
Sat.	18	4.32	6.17
Sun.	19	4 32	6.17
Mon.	20	4 32	6.17
Tue.	21	4 32	6.17
Wed.	22	4 42	6.12
Thu.	23	4.42	6.12
Fri.	24	4.42	6.12
Sat.	25	4.42	6.12
Sun.	26	4.42	6.12
Mon.	27	4 42	6.12
Tue.	28	4 42	6.12
Wed.	29	4.47	6 07
Thu.	30	4.47	6.07
Fri.	31	4.47	6.07

TOTAL HOURS DURING 1908.

	Hrs.Min.
January	481.50
February	329 15
March	351.50
April	341.50
May	233.05
June	218.10
July	282.55
August	254.55
September	292.25
October	420.45
November	374.30
December	411.05
	3992.35
Deduct on account of 50 min. extinguish'ng time	30.30
Total, yr.	3962.05

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
CHICAGO, 218 La Salle Street.
SAN FRANCISCO, 512 Oak Street.

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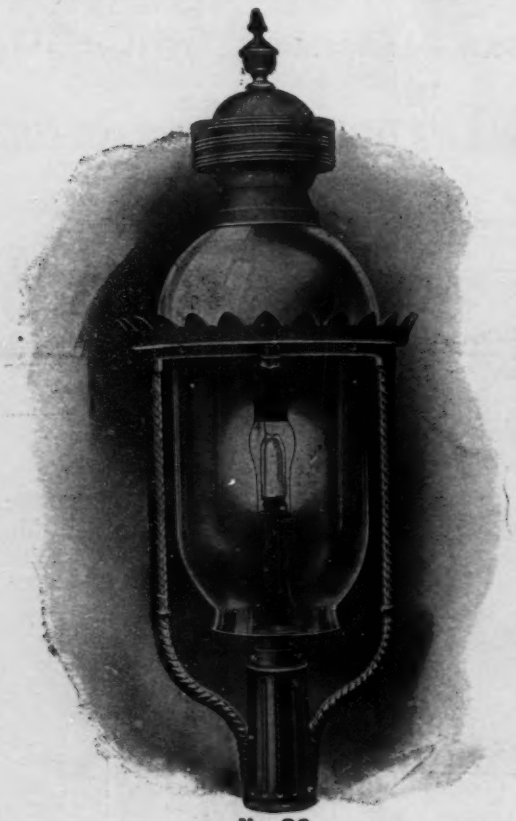
....OF AMERICA....



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Will Not Flash Back.
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Nashua, N. H.
Augusta, Me. (2d contract).
Everett, Mass.
Jenkintown, Pa. (2d contract).
Coney Island, N. Y.
Mexico, Mo.
Jacksonville, Fla.
Syracuse, N. Y. (2d contract).
Atlanta, Ga. (3d contract).
Holyoke, Mass.
Peoria, Ills.
Schnectady, N. Y. (2d contract).
Danbury, Conn.
Galveston, Tex. (2d contract).
Quebec, Canada.
Indianapolis, Ind. (2d contract).
Bessemer, Ala.
Waterbury, Conn. (5th contract).
Sioux Falls, S. D. (3d contract).
Philadelphia, Pa.

TOTAL SETS INSTALLED TO JULY 1, 1907, ... 34
TOTAL SETS TO DATE, ... 668
TOTAL DAILY CAPACITY, ... 541,655,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
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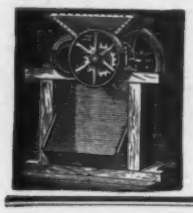

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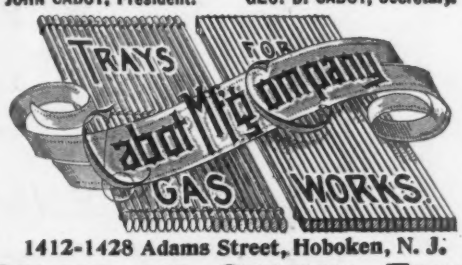

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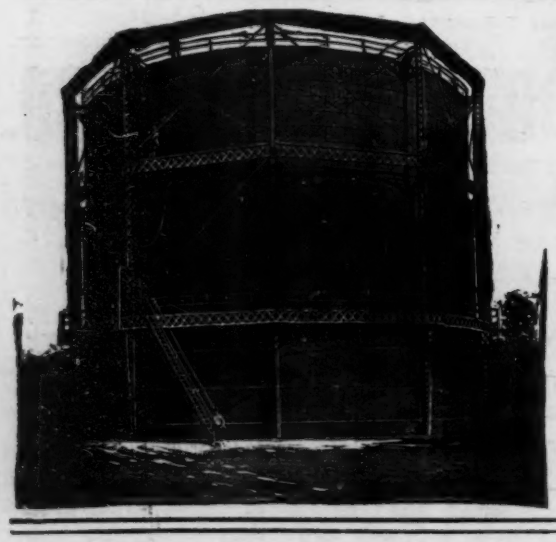

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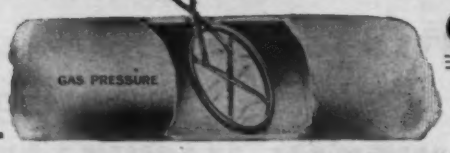

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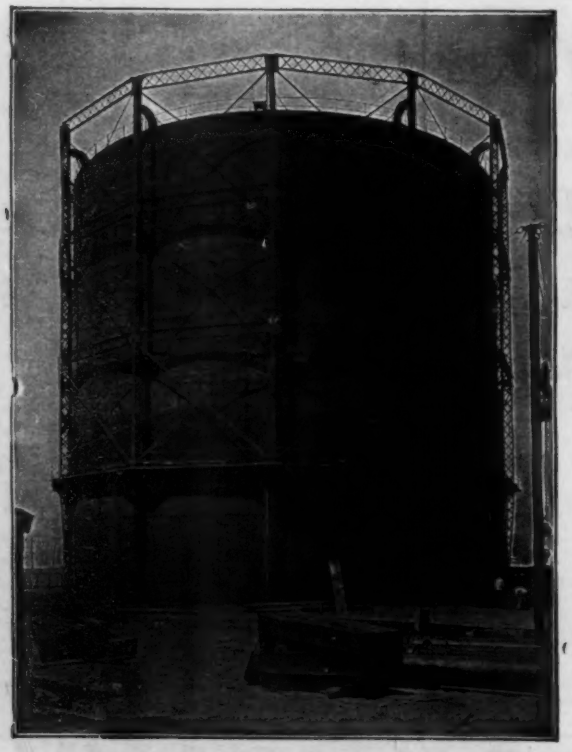

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